

What Our Schools Are Teaching

*An Analysis of the Content of Selected Courses of Study
with Special Reference to*

SCIENCE, SOCIAL STUDIES, AND INDUSTRIAL ARTS

By

HERBERT B. BRUNER

*Professor of Education and Head of the Department of the Exceptional,
Teachers College, Columbia University*

HUBERT M. EVANS

*Instructor in Mathematics and Science,
Lincoln School, Teachers College, Columbia University*

CECIL R. HUTCHCROFT

*Associate Professor of Industrial Arts,
Colorado State College*

C. MAURICE WIETING

*Formerly Instructor in Curriculum,
Teachers College, Columbia University*

HUGH B. WOOD

*Professor of Education,
University of Oregon*

BUREAU OF PUBLICATIONS

Teachers College • Columbia University

NEW YORK • 1941

•

**COPYRIGHT, 1941,
BY
TEACHERS COLLEGE
COLUMBIA UNIVERSITY**

•

STAFF

HERBERT B. BRUNER, *Director*

HUGH B. WOOD, *Associate Director*

Consultants

FRANCIS D. CURTIS, *Professor of Secondary Education and the Teaching of Science,
University of Michigan, Ann Arbor, Michigan*

EMANUEL E. ERICSON, *Director, Division of Industrial Education, Santa Barbara
State College, Santa Barbara, California*

Research Assistants

KATHRYN T. BURKE, *Formerly Assistant in Curriculum Laboratory*

VERA M. GUSHEE,* *Formerly Assistant in Curriculum Laboratory*

ALLIENE HARDER, *Formerly Assistant in Curriculum Laboratory*

WILLIAM J. LOWRY,* *Formerly Superintendent of Schools, Springfield, Ill.*

MILDRED WIESE, *Curriculum Consultant, American Education Press*

Assistants

JOSEPHINE COX

INEZ LEWIS

MARGARET ROTH

Graduate Students Assisting in the Investigation

ESTER ANSON

FERN L. BOELL

MOITA DAVIS

GEORGE W. DAWSON

ALMA MOORE FREELAND

WILHELMINA HILL

FLOSSIE KYSAR

WILLIAM J. McCALLUN

GLADYS MILLER

FRANK M. MISNER

LUELLA OVERN

FERN SCHNEIDER

DONALD TOBEY

WILLIAM TUCHMAN

Clerical Assistants

MARIE HOLMES

JANE MILLS

CHARLOTTE YATER

Preface

THIS investigation, which covered a period of five years, required in addition to the work of the authors and the consultants, (1) the full-time service of five research assistants and three clerical assistants for one year; (2) the part-time services of ten able graduate students for one year; and (3) the part-time services of one hundred clerks for from one to six months. The enormous mass of materials to be analyzed through successive screening processes made such a staff necessary.

The materials now available for study cover the fields of art, business education, health and physical education, home economics, industrial arts, language arts, mathematics, science, and social studies. They consist of:

- (1) The original 85,000* courses of study in the Curriculum Laboratory and Library of Teachers College, Columbia University.
- (2) Detailed and carefully constructed outlines of 1,175 selected courses of study.
- (3) Approximately 500,000 topic cards. Each of these cards contains a single small topic of content or a single item of bibliography, overview, activities, objectives, outcomes, and the like. These cards were made from 1,189 selected courses.
- (4) Unit-topic charts for fifty-nine subject and grade divisions, such as eighth grade science or sixth grade social studies.
- (5) Master unit-topic charts for the nine subject matter fields listed above.
- (6) Master index cards. These cards have been constructed for a few selected topics, and data are available for the construction of others as the need arises.

The present volume is confined to a discussion of the purposes and techniques of the study and an interpretation of some of the data in the fields of science, social studies, and industrial arts, closing with some suggestions and conclusions emerging from the entire study.

Wide use is being made of the data in all nine fields in the preparation of courses of study and other curriculum materials.

* The majority of these courses were so sketchy or so nearly like courses selected for this investigation that they could be eliminated from further detailed consideration.

From the beginning of the project the authors have had from time to time the valuable advice of able consultants. During the early stages it became clear at staff conferences attended by Dr. Ben D. Wood, Professor of Collegiate Research, Columbia University and Dr. Helen M. Walker, Professor of Education, Teachers College, Columbia University, New York City, that the data would not lend themselves to anything approaching exact statistical treatment. Although an "index of significance" has been utilized to indicate relatively and rather grossly the frequency with which any topic or item appears in courses of study, the reader is warned not to consider this index exact and therefore not to attempt to draw from our tables conclusions of a highly statistical nature. On the other hand, the staff working on this project believes that the extreme care which has been taken at every stage of the work makes the tables and conclusions as accurate and as valid as it is humanly possible to make them. Furthermore, many members of the staff have been working with courses of study in their own fields for many years and have utilized this experience in their interpretations.

The staff has had the discerning criticism and advice of Dr. Francis D. Curtis on the chapter on science and of Dr. Emanuel E. Ericson on the chapter on industrial arts.

The work of the research assistants and the assistants ranged from the outlining of courses of study to the compilation of data. It is our judgment that a more efficient and loyal group was never assembled.

The study was made possible by a grant from the Curriculum Research Department of F. E. Compton & Company, publishers of Compton's Pictured Encyclopedia. To Mr. Harry C. Johnson, Executive Director, Mr. Frank E. Compton, Chairman of the Board, Mr. S. J. Gillfillian, President, and to the other officers of the Company, we are indebted for inspiration and guidance and to Mr. Athol Rollins, Managing Editor, and to Mrs. Hazel Ott, Director of Curriculum Research of this Company, we are grateful for most discriminating advice and help.

Through the generosity of Teachers College we were permitted extensive use of the materials and facilities of the College, especially those available in the Curriculum Laboratory.

To all who have so ably assisted with this study we are most deeply grateful, both professionally and personally.

THE AUTHORS

Contents

CHAPTER	PAGE
I. INTRODUCTION	1
The Need of a Comprehensive Picture of Education Conditions	2
Educational Progress and Present Conditions	3
The Scope and Purpose of the Present Study	4
II. TECHNIQUES AND PROCEDURES	8
Courses of Study in the Curriculum Laboratory	9
Trends in Course of Study Production by Years	14
Courses Produced for Different Grade Levels	17
Courses Produced in Each Subject Area for Each Grade . .	22
Earliest Courses of Study on File in Curriculum Laboratory	23
Criteria for Judging Courses	25
Courses Judged Outstanding in the Various Grades by Years	26
Courses Judged Outstanding in the Various Subjects by Grades	27
Courses Judged Outstanding by Subject Fields and Years .	32
The Selection of Courses for This Study	32
Techniques Used in the Analysis of the Content of the Courses	
Selected	33
Preparation of the Raw Materials: Outlines of Courses .	33
Analysis of the Raw Materials	43
Preparation of Unit-Topic Charts	43
Indexes of Significance of Units or Major Topics by Grades .	50
Summary	53
III. ANALYSIS OF SELECTED COURSES OF STUDY IN	
SCIENCE	55
Science Courses of Study Available for This Study	55
Evaluation of Science Courses of Study	56
Selection of Courses for This Study	59
Techniques Used in the Analysis of Science Courses . . .	62
Subject Matter Found in Science Courses	62
Indexes of Significance of Units or Major Topics Found in	
Ninth Grade General Science Courses	64
Indexes of Significance of Major Topics Found in Science	
Courses	70

CHAPTER	PAGE
Trends in Content of Science Courses	92
Topics Occurring in Twenty-five or More Science Courses	94
Number and Range of Units or Major Topics	96
Overlapping of Content Between and Among Grades	97
Selection and Organization of Subject Matter Content	98
Internal Organization of Science Courses	102
Objectives Found in Science Courses	106
Some Conclusions	108
 IV. ANALYSIS OF SELECTED COURSES OF STUDY IN SO- CIAL STUDIES	 112
Social Studies Courses Available for This Study	112
Relative Proportion of Civics, Geography, History, and Social Studies Courses	114
Evaluation of Social Studies Courses of Study	117
Selection of Social Studies Courses for Detailed Analysis	118
Techniques Used in the Analysis of Social Studies Courses	119
Content of Social Studies Courses as Shown by Master Unit- Topic Chart	121
World History	121
American History	124
Geography	125
Government	126
State History and Geography	128
Social Problems	128
Communication and Transportation	128
International and Peace Relations	131
Conservation	132
Social Problems	132
Content of Social Studies Courses by Grade Levels	134
Grade 4	134
Grade 5	135
Grade 6	137
Grade 7	137
Grade 8	138
Grade 9	140
World History	140
American History	141
Modern Problems	141
Types of Organization of Social Studies Courses	144
The Separate Subject Matter Organization	144

Contents

xi

CHAPTER	PAGE
Correlation Between and Among Different Social Studies Areas	144
Correlation with Other Subject Matter Areas	145
Modern Problems Organization	145
Broad Fields Organization	145
Core Curriculum Organization	146
Guided Experience Organization	146
Pupil Experience Organization	146
 V. ANALYSIS OF COURSES OF STUDY IN INDUSTRIAL ARTS AND VOCATIONAL EDUCATION	 148
Industrial Arts and Vocational Education Courses Available for This Study	148
Evaluation of Industrial Arts and Vocational Education Courses	149
Selection of Courses for This Study	150
Techniques Used in the Analysis of Industrial Arts and Vocational Education Courses	150
Illustrations of Courses	157
Organization of Industrial Arts and Vocational Education	162
Job Analysis of Trades and Industries	164
Analysis of General Adult Needs	165
The Present Needs of the Pupil	165
Breadth or Scope of Courses	166
Internal Organization of Content	167
Content of Industrial Arts and Vocational Education Courses	170
Architectural Drawing	171
Auto Mechanics	172
Electricity	175
General Shop	178
Household Mechanics	179
Machine Drawing	180
Machine Shop	180
Mechanical Drawing	181
Metal Work	183
Printing	184
Woodwork	185
Summary of Content in Industrial Arts	187
Conclusions	190

CHAPTER	PAGE
VI. SOME SUGGESTIONS AND CONCLUSIONS EMERGING FROM THIS STUDY	195
The Topic Transportation—An Illustration	195
Percentages of Courses Within Each Field Treating Transportation	198
Average Number of Transportation Items per Course by Subject Field	199
Average Number of Transportation Items per Course by Grades	200
Transportation as a Topic in the Elementary Grades	202
Transportation as a Topic in the Junior High School	202
Transportation as a Topic in the Senior High School	204
Curriculum Trends	204
Trends in Organization	205
Trends in Content	207
APPENDIX I	
Criteria for Evaluating Teaching and Learning Materials and Practices	211
APPENDIX II	
Some Principles for Establishing and Conducting a Curriculum Workshop-Laboratory	221

.

What Our Schools Are Teaching

CHAPTER I

Introduction

THE schools of America have witnessed in the last two decades greater activity in curriculum improvement, with the accompanying development of courses of study, than in all their previous history. This activity has not been confined to curriculum programs in local communities and states and to the production of courses of study. Scores of frontier thinkers, pseudo-frontier thinkers, and theorists of varying opinions have made their contributions. Educational prophets have offered diverse predictions of the future of education, ranging from the dire and dolorous to the glowing and utopian. Many a reformer charged with evangelical enthusiasm has urged his pet theory. Educational trends have been "viewed with alarm," accepted complacently, or hailed as harbingers of greater things to come. Scores of suggestions regarding the aims of American education have been proffered. These have ranged in scope from panaceas to minor tinkering with small sections of subject matter fields.

Evidence of the extent to which the schools themselves have participated in this movement is provided by a comparatively recent survey which included every city in the United States of 25,000 population and above and every tenth community below that size listed in the *Educational Directory* of the United States Office of Education. This survey revealed that "organized curriculum development programs are now under way in well over seven-tenths of the cities of above 25,000 population" and that "slightly less than half and exactly one third of the school systems serving communities of 5,000 to 25,000 and below 5,000 respectively reported such enterprises."¹ Since these data were gathered there has been every indication that the activity has continued. This means that tens of thousands of teachers, supervisors, and administrative officers have been busily engaged in curriculum improvement in the last twenty years. By actual count approximately 85,000 courses of study—if we define a

¹ Hand, Harold C. "Analysis of the Present Status in Curriculum Thinking," pp. 1-2; in *The Changing Curriculum*. New York: D. Appleton-Century, 1937.

course of study as curriculum materials for one subject for one grade level—are now on the shelves of one curriculum laboratory (and this laboratory does not contain *all* the courses of study in the country).

THE NEED OF A COMPREHENSIVE PICTURE OF EDUCATIONAL CONDITIONS

What does this activity really mean? How far has it affected actual practice in the schools? At the national and state conventions of our various educational associations, numerous references are made to improved practices. Often these are accompanied by alluring descriptions. The average individual might leave many of these educational gatherings with the belief that meteoric or at least substantial improvement in education is being made all along the line. Such an experience may have psychological effects of encouragement, but the fact remains that these optimistic statements are not based on a thorough survey of existing conditions in education in the country at large. No systematic or comprehensive appraisal of curriculum work or materials has been made. No one knows, for example, to what extent American education as a whole has incorporated the new theories or ideas advocated by educational leaders and reformers. In other words, our frontier thinkers as well as others have been suggesting directions that American education might take without accompanying these suggestions with a clear and accurate picture of the present educational situation. It is true that certain appraisals of the techniques used in curriculum improvement have been made from time to time. These appraisals, however, have been more concerned with methodology and forms of organization than with the actual content of courses of study, or what has taken place in the schools, or of attempts to assist in genuine pupil growth.

*The Changing Curriculum*² contains what is probably the best summary of appraisals up through 1936. Harold Rugg, Hopkins, the Nortons, Caswell and Campbell, and Draper, as well as many other writers in periodical literature, have also attempted to evaluate certain aspects of the curriculum movement. Curtis, Beauchamp, Wilson, Lide, and others have made analyses of the gross content and format of certain courses of study and other curriculum materials. These studies,

² Harap, Henry and Others *The Changing Curriculum*. New York: D. Appleton-Century, 1937.

which have utilized a variety of techniques, are valuable for the specific purposes for which they were conducted and in the areas which they cover. It is not possible, however, to obtain from them, singly or together, a comprehensive picture of present conditions in the American public schools.

EDUCATIONAL PROGRESS AND PRESENT CONDITIONS

One thing is certain. Whatever aim an educational philosopher may propose, whatever direction an educational reformer may wish to take, whatever change in educational practice an administrator may desire to introduce, the first move necessary is to get a definite and clear picture of the existing educational situation. For example, the successful teacher is one who studies most diligently the pupils with whom he is to deal, and those aspects of the environment, in school and out, with which these pupils come in contact. Such an appraisal of human materials and environmental factors constitutes the first sound step in intelligent teaching. It is necessary, of course, that the appraisal which this teacher makes be conducted in the light of socially conceived aims which are constantly emerging from a sound and continuously developing philosophy. Similarly, those who would improve education in communities, states, or the nation should be putting forward continuous effort to establish for themselves and for education proper and promising goals. Here is where the contributions of our leaders in educational thought must be given careful consideration. On the other hand, however, once our aims have been clarified we must base the actual process of improvement upon a thorough understanding of what we have. Too many of us in education have had our heads in the clouds. In the desire to call the attention of our fellows away from mechanical minutiae, too many of us have been pointing to far-off goals without attempting to assist in determining methods by which these goals can be attained.

If genuine and lasting progress is to be made toward the attainment of such goals, it is imperative that we constantly strive for sounder and more realistic understandings of education's present failures and accomplishments; for only in this way can we formulate and take the most effectual immediate next steps in the desired directions. Most superintendents of schools, principals, and others who are in

next-to-the-child-, next-to-the-parent-, and next-to-the-taxpayer situations are keenly aware of the necessity for possessing such understandings. Those who are not are often brought to such awareness rather abruptly.

Insistence upon understanding present conditions should not be allowed to become an argument for maintaining the *status quo* or for yielding supinely to the forces of reaction that play upon those actively engaged in curriculum improvement. The danger in this direction is as great as that involved in setting up and attempting to attain goals without proper consideration of existing conditions. The plea here is for a more accurately determined and realistic understanding of actual conditions in American education and in each individual community, on the thesis that such understanding is absolutely vital to the success of any program of educational improvement, whether that improvement is concerned with one individual, with a classroom, with a community, or with the country at large. The cause of genuinely progressive education has probably suffered as much from lack of such understanding and the informations basic to it as from any other single factor.

THE SCOPE AND PURPOSE OF THE PRESENT STUDY

Assuming that an inventory of the existing situation in the American public schools is needed, we are then confronted with two questions: Of what does such an inventory consist? and How should such an inventory be made? An all-inclusive survey would, of course, probe into every activity of pupils, teachers, administrators, and citizens that has any connection whatsoever with the educational process, both in and out of school. It would cover the concomitant and often important experiences which the pupil brings to the classroom from all kinds of outside contacts. It would include an investigation of every school experience and its effect upon the happy and socially adequate growth of all children. It would include an investigation of the effects of all the environmental factors involved. It would include the study of every kind of educational material—textbooks, courses of study, visual aids, and supplementary material. Obviously the efficacy of experiences and materials depends upon the purposes they are to serve and the ways in which they are to be utilized.

The problem, of course, is staggering in its proportions. It is so basic to the advancement of education, however, that it should be attacked on every possible front. The present investigation has limited its attention to a part of it—a consideration of the content or subject matter utilized in grades 4 to 12 inclusive, as far as this could be determined through an analysis of selected mimeographed and printed course of study materials in science, social studies, and industrial arts.

While courses of study have been produced in large numbers in communities of all sizes and in practically every subject field, it would be folly to assume that the mimeographed and printed documents of school systems are exact descriptions of the actual teaching materials or teaching and learning practices. In one community, for example, a small group of energetic and well-educated teachers might have developed a course of study that would measure high according to almost any set of sound criteria, and yet the average quality of teaching and learning practices might be of a standard lower than that indicated by the course of study. In another community splendid teaching and learning practices might be the rule but little of the material utilized might have found its way into mimeographed or printed form. Considering the increasing emphasis which has been placed on curriculum improvement programs throughout the country since 1930, however, it is highly probable that in most instances those communities where good teaching and good learning practices exist—as well as hundreds of other communities—have collected these teaching and learning materials and described their practices in courses of study provided in one form or another. In other words, the fact that tens of thousands of courses of study from a wide variety of communities were produced each year from 1930 to April 1, 1940, the period covered by this investigation, seems to warrant the conclusion that much of the content materials and experiences of teaching and learning during that period has been included in courses of study; certainly a highly representative and comprehensive cross section has been made available.

It is undoubtedly true that in many instances the most progressive teachers do not follow the printed courses of study closely and that they probably add materials and practices which are superior to those listed in the courses. On the other hand, many of these progressive teachers have been appointed to course of study committees and it is very likely that many of their ideas, at least at the time of writing the courses, are contained in the courses themselves. This

view is confirmed by Wilson.³ Since in most cases the better teachers have borne the brunt of the work of preparing course of study materials, the chances are that many of the courses contain descriptions of content and practices which are more progressive than the general practice in the school systems for which the materials were prepared. Furthermore, it is probable that the materials used in instruction where the authoritarian procedure still obtains—and these situations are by no means few—do not often vary widely from the requirements of the printed course of study. Therefore, in any attempt to determine present practices and the content used in these practices, it seems clear that one of the most fertile sources for study is the mimeographed and printed courses of study prepared and utilized by many thousands of our teachers.

It would have been desirable to have supplemented this investigation by comprehensive, careful observations of classrooms in different localities, grades, and subjects, and under many varying types of teaching and learning procedures. This undertaking would have involved interviewing teachers, pupils, parents, and many others. Properly conducted, such an investigation would probably have yielded valuable results. To carry it through, however, would have been tremendously costly in time, effort, and money, and would have involved many difficulties, not the least of which would have been the training of observers and interviewers and the proper evaluation and interpretation of their joint findings. There is no doubt, however, concerning the value of such a study, not only for its intrinsic contributions, but for the light it would throw on the extent of the gap, if any, between the materials used in actual teaching and learning and those described in mimeographed and printed documents.

It would also have been desirable to have made a special study of the materials utilized by that relatively small number of schools and teachers who are conducting promising experiments in education and utilizing subject matter materials which in some instances have not been listed in courses of study.

Furthermore, since in a vast majority of classes the textbook is the most used course of study, an analysis of textbooks would have thrown additional light on the problem being attacked.

³ See Wilson, Howard E. *Education for Citizenship*. The Regents' Inquiry into the Character and Cost of Education in the State of New York. New York: McGraw-Hill Book Company, 1939.

All three of these investigations were outside the province of the present study. If and when such inquiries are made, they will provide information with which the results of the present study can be compared.

The general purpose of this project has been to attempt to ascertain the subject matter content that is being utilized in the public schools of America, as far as this can be determined through an analysis of representative courses of study in certain areas. More specifically stated, this purpose is twofold:

1. To attempt to analyze for subject matter content selected courses in science, social studies, and industrial arts for grades 4 to 12. The courses analyzed were produced by representative school systems during the period 1930 to 1940.

2. To attempt through this analysis to make available to those who are preparing curriculum materials, such as courses of study, textbooks, study guides, and encyclopedias, the following guides:

- a) Information regarding the frequency with which certain topics are treated in various subjects and grades.

- b) A partial analysis of patterns of organization of content in certain fields.

- c) An estimate of some general curriculum trends and shortages suggested by the data, together with certain other interpretations which it is hoped will be of assistance to those working with curriculum materials.

CHAPTER II

Techniques and Procedures

SINCE 1924, Teachers College, Columbia University, has been collecting courses of study from communities throughout the United States. Annually (from 1924 to 1937) each of 7,000 communities has been invited to send to the Curriculum Laboratory of the College new materials that have been produced during the year. On April 1, 1940, there were filed in the Curriculum Laboratory some 28,500 courses of study dealing with separate subjects (for example, mathematics or English) and 56,000 general courses of study.

For the purposes of this investigation a course of study has been defined as curriculum material¹ concerning one subject matter field for one grade. For example, junior high school mathematics materials for grades 7, 8, and 9 have been counted as three courses. In addition, course of study materials presented as a group of activities or in similar form, but not as subject matter, have been considered a course of study for the grade represented. Subject matter areas as they are used in this study may be made up of several related subjects: the area of language arts includes reading, literature, composition, grammar, spelling, and handwriting; the social studies group includes history, civics, geography, economics, sociology, and social studies; and the health and physical education area includes health, physical education, safety, and gymnastics.

When data were compiled for the tables included in this investigation, every piece of literature in the Curriculum Laboratory and in the Teachers College Library which was called a course of study was counted, whether it was mimeographed, typed, or printed. Literature which included material for several grades was counted as many times as there were grades represented. For example, a volume which treated the science program of all the first six grades was counted as six courses. When several subjects were included in one volume the course of study was called *general*. These general courses were counted by subjects and grades, as were the separate subject courses.

¹ The material may be in typewritten, mimeographed, or printed form.

COURSES OF STUDY IN THE CURRICULUM LABORATORY

Table I shows the total number of courses of study received up to April 1, 1940, distributed according to the various subject matter areas.

TABLE I

Courses of Study in the Curriculum Laboratory, Teachers College, Columbia University, April 1, 1940, Distributed by Subject Matter Areas

Subject Matter Area	SUBJECT COURSES		GENERAL COURSES		BOTH GROUPS	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Adult Education	51	0.02%	18	0.03%	69	0.1%
Agriculture	252	0.9	838	1.5	1,090	1.3
Art	1,609	5.7	4,043	7.2	5,652	6.7
Commercial Education	613	2.2	1,097	2.0	1,710	2.0
Extracurricular	104	0.4	69	0.1	173	0.2
Foreign Language	867	3.0	2,119	3.8	2,986	3.5
Guidance	591	2.1	857	1.5	1,448	1.7
Health and Physical Education	3,539	12.4	4,913	8.8	8,452	10.0
Home Economics	1,215	4.2	1,163	2.1	2,378	2.8
Industrial Arts	1,203	4.2	1,749	3.1	2,952	3.5
Language Arts	6,593	23.1	17,045	30.4	23,638	27.9
Mathematics	3,277	11.5	5,601	10.0	8,878	10.5
Music	1,815	6.4	3,938	7.0	5,753	6.8
Science	1,472	5.2	3,659	6.5	5,131	6.1
Social Studies	5,029	17.6	8,393	15.0	13,422	15.9
Special Courses	247	0.9	293	0.5	540	0.6
Core Courses			381	0.7	381	0.5
Total	28,477		56,176		84,653	

The distribution of these courses of study by subject matter areas and dates of publication is shown in Table II. Table III gives the distribution of courses by grade levels and dates of publication. Table IV shows the distribution by subject matter areas and grade levels. A study of Tables II, III, and IV reveals some rather significant trends. Before these trends are described, however, it will be well to note that, though the exact number of pages in each of the courses was

TABLE II

*Courses of Study Received by the Curriculum Laboratory, Teachers College,
and Dates of*

Date	Group	Adult Education	Agriculture	Art	Commercial Education	Extracurricular	Foreign Language	Guidance	Health and Phys. Education	Home Economics	Industrial Arts
1923 and before	Subject.....	3	110	420	49	0	87	91	718	286	363
	General ..	7	509	2,219	613	22	1,143	416	2,219	646	873
1924	Subject.....	3	11	36	18	1	50	1	147	33	52
	General.....		38	166	17		42	29	241	39	44
1925	Subject.. . .	3	8	130	58	9	41	16	115	84	85
	General.....	2	26	183	33	1	77	62	226	53	101
1926	Subject.....	4	8	116	23	6	63	27	173	32	36
	General.... .	1	32	226	80	7	105	76	330	86	99
1927	Subject.....	4	28	116	35	1	66	70	198	69	85
	General.....		24	277	46		91	67	415	58	73
1928	Subject.....	4	9	80	35	17	68	43	174	74	83
	General.....		38	222	90	4	176	35	251	61	77
1929	Subject	5	2	54	49	14	55	34	166	62	53
	General.....	1	41	136	42	7	100	45	206	44	77
1930	Subject.....	8	6	65	40	3	47	21	277	96	57
	General... . .		31	134	15	5	35	26	270	28	64
1931	Subject.....	9	1	76	43		50	20	237	46	57
	General	2	25	114	28	4	75	4	264	36	79
1932	Subject.....	1	22	64	31	30	27	13	204	72	27
	General.....		31	114	38	8	78	33	166	28	51
1933	Subject.....		20	80	47		45	9	123	59	28
	General... . .		11	87	22		69	27	94	34	42
1934	Subject. . . .		1	36	25		34	1	108	16	20
	General		21	14	12		17		27	6	8
1935	Subject.....	2	9	31	30	6	20	70	119	41	33
	General		5	13	8		10	22	22	5	22
1936	Subject.....	3	4	76	17	6	51	30	169	49	30
	General.....		1	26	3		14	9	68	2	34
1937	Subject	2	4	26	58		33	14	142	42	29
	General	1		36	25	6	27	1	33	10	45

TABLE II (Continued)

*Columbia University, Distributed by Various Subject Matter Areas
Publication*

Language Arts	Mathematics	Music	Science	Social Studies	Special Classes	Misc and Core Curriculum	Total Subject Courses	% Subject Courses	Total General Courses	% General Courses	Total Both Groups	% Grand Total
1,602	967	390	322	1,403	63		6,874	24.2%				
8,189	2,847	1,889	1,991	4,166	100	83			27,932	49.8%	34,806	41.1%
321	186	79	62	220	8		1,228	4.3				
856	252	218	141	386	5				2,474	4.4	3,702	4.4
367	149	74	39	189	1		1,368	4.8				
870	258	191	152	470	12	13			2,730	4.9	4,098	4.8
384	173	145	57	230	22		1,499	5.3				
1,198	401	248	186	528	64	4			3,671	6.5	5,170	6.1
306	168	103	90	219	14		1,572	5.5				
1,255	419	268	206	680	25				3,904	7.0	5,476	6.5
318	175	109	96	253	8		1,546	5.4				
951	272	223	259	459	15	2			3,135	5.6	4,681	5.5
328	132	57	61	257	17		1,346	4.7				
643	201	163	149	284	19				2,158	3.8	3,504	4.1
317	231	116	66	180	19		1,549	5.5				
927	245	168	137	416	10				2,511	4.5	4,060	4.8
322	132	150	83	236	9		1,471	5.2				
803	242	147	130	393	7	8			2,361	4.2	3,832	4.5
290	95	41	87	179	14		1,197	4.2				
550	164	132	76	245	9	5			1,728	3.1	2,925	3.5
283	109	148	44	204	8		1,207	4.3				
344	96	98	75	133	3	30			1,165	2.1	2,372	2.8
158	82	49	38	164	1		733	2.6				
94	38	17	27	42	3				326	0.6	1,059	1.3
151	41	16	48	179	7		803	2.8				
36	17	15	15	35	5				230	0.4	1,033	1.2
152	57	40	83	178	12		957	3.4				
156	44	40	28	58	5	25			513	0.9	1,470	1.7
140	72	38	73	89	7		769	2.7%				
47	25	40	17	15		174			502	0.9%	1,271	1.5

TABLE II (Continued)

*Courses of Study Received by the Curriculum Laboratory, Teachers College,
and Dates of*

Date	Group	Adult Education	Agriculture	Art	Commercial Education	Extracurricular	Foreign Language	Guidance	Health and Phys. Education	Home Economics	Industrial Arts
1938	Subject		1	60	20		17	24	83	28	26
	General			21					21	2	
1939	Subject			12	4		23	29	50	24	23
	General										
1940	Subject			9							
	General										
No date	Subject		8	122	131	11	90	78	336	102	116
	General	4	5	55	25	5	60	5	60	25	60
<hr/>											
Total Subject Courses . . .		51	252	1,609	613	104	867	591	3,539	1,215	1,203
% Subject Courses		0.2	0.9	5.7	2.2	0.4	3.0	2.1	12.4	4.2	4.2
Total General Courses		18	838	4,043	1,097	69	2,119	857	4,913	1,163	1,749
% General Courses		0.03	1.5	7.2	1.9	0.1	3.7	1.5	8.8	2.8	3.1
<hr/>											
Total Both Groups		69	1,090	5,652	1,710	173	2,986	1,448	8,452	2,378	2,952
% Grand Total		0.1	1.3	6.7	2.0	0.2	3.5	1.7	10.0	2.8	3.5

TABLE II (Continued)

*Columbia University, Distributed by Various Subject Matter Areas
Publication*

Language Arts	Mathematics	Music	Science	Social Studies	Special Classes	Misc. and Core Curriculum	Total Subject Courses	% Subject Courses	Total General Courses	% General Courses	Total Both Groups	% Grand Total
96	80	49	56	124	18		682	2.4				
51	20	21	10	23	5	26			200	0.4	882	1.0
107	38	33	32	67	6		448	1.6				
					1	6			7	0.01	455	0.5
9	8	9					35	.1				
									0		35	0.04
942	382	169	135	658	13		3,193	11.2				
75	60	60	60	60	5	5			629	1.1	3,822	4.5
6,593	3,277	1,815	1,472	5,029	247		28,477					
23.1	11.5	6.4	5.2	17.6	0.9							
17,045	5,601	3,938	3,659	8,393	293	381			56,176			
30.4	10.0	7.01	6.5	15.0	0.5	0.7						
23,638	8,878	5,753	5,131	13,422	540	381	28,477		56,176		84,653	
27.9	10.5	6.8	6.1	15.9	0.6	0.5						

not counted, rather extended and ample inspection revealed that the average general course is much less comprehensive than the average separate subject course; in fact, the general course contains on an average less than one-fifth the number of pages contained in a special subject matter course. This is particularly true of the general courses published prior to 1924. In many cases these courses were single paragraph or single page statements of what the requirements were in each of the separate fields, and they often included only a list of the textbook material to be covered. There are, of course, a few notable exceptions, such as the original Baltimore County, Maryland, course.² It must be remembered that some of the general courses, especially those issued by state departments of education, are widely used in the rural sections and the smaller communities.

TRENDS IN COURSE OF STUDY PRODUCTION BY YEARS

The data in Table II reveal the following trends in course of study production by years.³

1. During the decade 1924 to 1933 inclusive there was a pronounced increase in the number of separate subject matter courses produced. In fact, during that decade twice as many subject courses of study reached the Curriculum Laboratory files as the Laboratory had been able to collect for all the preceding years. In 1934 there was a serious drop, about half of which was recovered by 1936.

The marked decrease from 1,207 courses in 1934 to 733 courses in 1935 was probably due to (a) the depression, and (b) the fact that a number of schools had produced courses which they were trying out.

2. There was a decrease in the number of courses received from 1937 to 1940 inclusive. This may be due to any one of a number of reasons:

- a) The accumulation of courses of study which are in use.

- b) The fact that from 1924 to 1926 the Teachers College Curriculum Laboratory was practically the only organization besides the United States Office of Education and the state departments of education that collected curriculum materials. Since that time, fortunately, there have sprung up many other laboratories, most of which

² *Baltimore County Course of Study for Elementary Schools. Grades I to VIII.* Baltimore: Warwick and York, Inc., 1919.

³ The reader should bear in mind that these tables and this discussion are based only on the courses of study received by the Curriculum Laboratory.

are asking for and receiving materials in their local areas and several of which are receiving materials from the nation at large. Many schools find it impossible to send their courses to a large number of laboratories.

c) The fact that from 1937 on requests of the Curriculum Laboratory for materials have been sent to only a limited number of sources, namely, state departments, communities of 20,000 and over, and communities which had produced the most and best courses of study in the years 1924 to 1937.

d) The fact that several states and communities which formerly issued specific subject matter courses have been publishing study bulletins and other similar materials which are not included in this investigation.

e) The increasing recognition on the part of some educators that courses of study are only a part, although an important part, of the curriculum improvement movement.

f) The fact that all the materials for any one year reached the Curriculum Laboratory as much as three years later, which means that a few more courses for 1937 and many more for 1938, 1939, and 1940 will be received during the next three years. In fact, one could in fairness estimate that the 1937, 1938, and 1939 figures will eventually equal if not exceed the figures for 1936.

3. There has been a marked decrease in the production of general courses since 1924. The Curriculum Laboratory files now contain practically as many general courses produced prior to 1924 as have been produced since. It is interesting to note that during the five years, 1924 to 1928 inclusive, an average of 3,183 general courses was received, whereas during the succeeding five years, 1929 to 1933 inclusive, the average was only 1,985, while for the next five years the average dropped to only 354. (See section 2 above for possible explanation of the decrease in the last five years.)

4. It is interesting to note that 174 core curriculum courses were available for 1937. Although there are not sufficient data to draw final conclusions, it would seem that the trend of curriculum thinking in the country is beginning to express itself in an increased number of core curricula.⁴

⁴ In this investigation, activity programs, experience curricula, and core curricula of various kinds are included under "Miscellaneous and Core Curricula" in the tables, as well as those earlier courses produced prior to 1924 which consisted, in the main, of brief discussions of the whole school program and did not center materials around any unified ideas.

5. The following trends may be noted in the subject matter areas:

a) As might be expected, there are more courses in the language arts than in any other field, owing to the fact that language arts includes reading, literature, composition, grammar, spelling, and handwriting. Most of the courses are in the fields of language and grammar (or composition and grammar), literature, and reading, although a large proportion of the so-called general courses include spelling and handwriting as well. The language arts courses constitute 23.1 per cent of all the subject courses on file in the Laboratory; 30.4 per cent of all the courses contained in the general courses were also in this field.

b) Next in order is the social studies group, which includes social studies, history, geography, civics, economics, sociology, and citizenship courses. Most of these courses are in the fields of history and geography, although a very rapidly increasing number of courses have been appearing in social studies as such during the last five years. Social studies constitutes 17.6 per cent of the subject courses and 15.0 per cent of the courses contained in general courses.

c) Mathematics ranks third in order, comprising 11.5 per cent of the subject courses and 10.0 per cent of the courses within the general courses.

d) Health and physical education ranks a close fourth, comprising 12.4 per cent of the subject courses and 8.8 per cent of the courses contained in general courses.

e) Interestingly enough, music and art rank next in order, with music comprising 6.4 per cent of the subject courses and 7.01 per cent of the courses contained in general courses, and with art comprising 5.7 per cent of the subject courses and 7.2 per cent of the courses contained in general courses. Unfortunately, a very large percentage of these courses indicate merely the ground to be covered.

f) It is rather surprising that we should find comparatively few courses in science, since in this field are included all the branches of science in high school as well as the branches in elementary school. Only 5.2 per cent of the separate subject matter courses are in the field of science and only 6.5 per cent are subject courses contained in the general courses.

g) As would be expected, in industrial arts there are fewer courses; these constitute 4.2 per cent of the subject courses and 3.1 per cent of the courses contained in general courses.

h) Home economics ranks close to industrial arts, having 4.2 per

cent of the subject courses and 2.8 per cent of the courses contained in the general courses.

i) Next in order come commercial education with 2.2 per cent and 1.9 per cent respectively; guidance with 2.1 per cent and 1.5 per cent; agriculture with 0.9 per cent and 1.5 per cent; and special classes with 0.9 per cent and 0.5 per cent.

j) The two areas for which there are the least number of courses are extracurricular activities, which has 0.4 per cent and 0.1 per cent; and adult education, which has 0.2 per cent and 0.03 per cent respectively. With the growth of work in adult education in America, it is difficult to explain why so few courses have been received since 1931.

A word of explanation is necessary in connection with this brief interpretation of Table II. The mass of courses which existed prior to 1924 might lead the uninitiated to believe that the curriculum improvement movement, with its accompanying course of study construction phase, had been under way prior to 1924 as vigorously as it has been since that time. As a matter of fact, this is not the case. In the main the courses represented in the tabulations as having been produced prior to 1924 consist mostly of bare statements of ground to be covered. These statements were in the form of texts to be used and pages to be covered grade by grade, with exhortations as to the quality of work the superintendents of the schools hoped might be maintained. While it is true that many of the courses appearing in succeeding years, though more voluminous, were of little more value, nevertheless the courses produced since 1924 and especially those appearing from 1930 to 1940 were in general of decidedly greater educational value.

COURSES PRODUCED FOR DIFFERENT GRADE LEVELS

The data in Table III reveal that the number of courses produced for the various grades differs. More specifically they show:

1. There are about twice as many courses per grade for the first eight grades as there are for the last four, owing partly to the fact that there is a far larger proportion of general courses built on an 8-4 basis, with a relatively greater proportion in the first eight grades.

2. With the fundamental reorganization of the curricula of secondary schools which is being demanded not only by those in education but by the social and economic conditions in which we find ourselves

TABLE III (Continued)

Date	JUNIOR HIGH SCHOOL				SENIOR HIGH SCHOOL				No GRADE				ADULT EDUCATION				SUBJECT COURSES				GENERAL COURSES				TOTAL BOTH GROUPS	
	9		10		11		12		Sub.		Gen.		Sub.		Gen.		Sub.		Gen.		No.		%		Total	
1923 and before	275	1,521	178	1,409	169	1,535	168	1,487	334	275	16	35	6,874	24	2%	27,932	49.8%	2,474	4.4	34,806	41.1%	3,702	4.4			
1924.....	87	55	66	55	61	50	63	49	76	17	6		1,228	4.3		2,474	4.4			3,702	4.4					
1925.....	99	110	75	95	75	97	73	64	52	32	6	2	1,368	4.8		2,730	4.9			4,098	4.8					
1926.....	100	180	69	162	66	151	69	136	63	34	5		1,499	5.3		3,671	6.5			5,170	6.1					
1927.....	142	123	86	111	84	107	83	81	66	27	8		1,572	5.5		3,904	7.0			5,476	6.5					
1928.....	122	181	100	171	105	177	102	176	91	23	5	10	1,546	5.4		3,135	5.6			4,681	5.5					
1929.....	111	123	83	132	77	105	78	88	85	36	1		1,346	4.7		2,158	3.8			3,504	4.1					
1930.....	128	47	110	45	107	46	111	41	84	20	22		1,549	5.5		2,511	4.5			4,060	4.8					
1931.....	112	109	85	70	83	69	74	71	97	35	10	15	1,471	5.2		2,361	4.2			3,832	4.5					
1932.....	96	100	77	79	75	80	76	73	78	9	3	2	1,197	4.2		1,728	3.1			2,925	3.5					
1933.....	94	88	78	69	79	61	78	60	59	12	2		1,207	4.3		1,165	2.1			2,372	2.8					
1934.....	58	33	47	37	55	24	51	23	54	20	3		733	2.6		326	.6			1,059	1.6					
1935.....	76	25	67	27	55	34	55	25	39	3	4		803	2.8		230	.4			1,033	1.2					
1936.....	96	14	78	14	69	11	67	11	86	5	8	1	957	3.4		513	.9			1,470	1.7					
1937.....	70	58	70	40	68	50	69	52	73	13	2		769	2.7		502	.9			1,271	1.5					
1938.....	59	6	53	4	61	3	50	3	64	2	3		682	2.4		200	.4			882	1.0					
1939.....	44		40		40		40		22	1	3		448	1.6		7	.01			455	0.5					
1940.....	3								35	0.1			35	0.1						35	0.04					
No date.....	153	50	115	50	122	50	116	50	131	10	13	9	3,193	11.2		629	1.1			3,822	4.5					
Total.....	1,925	2,823	1,477	2,570	1,451	2,650	1,423	2,490	1,554	574	117	74	28,477			56,176				84,653						
% Subject Courses,	6.8		5.2		5.1		5.0		5.5		0.4															
% General Courses.....		50		4.6		4.7		4.4		10		0.1														
Total Both Groups.....	4,748		3,947		4,101		3,913		2,128		191	28,477				56,176				84,653						
% Grand Total	5.6		4.7		4.8		4.7		2.5		0.2	33.6				66.4										

TABLE IV

Courses of Study Received by the Curriculum Laboratory, Teachers College,

Grade	Adult Education	Agriculture	Art	Commercial Education	Extracurricular	Foreign Language	Guidance*	Health and Phys. Education	Home Economics	Industrial Arts	Language Arts	Mathematics
K.....			12				11	78	2	5	65	33
1.....		5	153		6	1	43	340	23	53	660	324
2.....		7	156		6	2	39	338	23	53	677	335
3.....		10	158		8	3	39	344	29	55	685	343
4.....		10	159		9	8	38	339	38	63	681	356
5.....		8	155		9	8	37	341	51	64	675	350
6.....		10	154		9	9	36	333	64	68	672	343
7.....		32	148	40	9	95	60	289	156	132	597	339
8.....		32	140	43	9	108	58	270	157	139	554	307
9.....		26	102	109	13	139	55	205	172	145	340	133
10.....		25	69	106	7	129	34	155	148	99	241	119
11.....		25	68	114	7	125	33	153	141	107	235	109
12.....		25	68	120	7	122	34	153	125	96	230	108
No grade....		37	67	79	5	116	73	192	85	109	265	75
Adult Education.....	51			2		2	1	9	1	15	16	3
Total Subject Courses....	51	252	1,609	613	104	867	591	3,539	1,215	1,203	6,593	3,277
% Subject Courses....	0.02	0.9	5.7	2.2	0.4	3.0	2.1	12.4	4.2	4.2	23.1	11.5
Total General Courses....	18	838	4,043	1,097	69	2,119	857	4,913	1,163	1,749	17,045	5,601
% General Courses...	0.03	1.5	7.2	2.0	0.1	3.8	1.5	8.8	2.1	3.1	30.4	10.0
Total Both Groups...	69	1,090	5,652	1,710	173	2,986	1,448	8,452	2,378	2,952	23,638	8,878
% Grand Total.....	0.1	1.3	6.7	2.0	0.2	3.5	1.7	10.0	2.8	3.5	27.9	10.5

* Courses of study appear under the heading of Guidance in the first six grades and the kindergarten

TABLE IV (Continued)

Columbia University, Distributed by Subject Matter Areas and Grade Levels

Grade	Music	Science	Social Studies	Special Classes	Core Curriculum	Total Subject Courses	% Subject Courses	Total General Courses	% General Courses	Total Both Groups	% Grand Total
K.....	29	16	58	2		311	1.1%	534	.95%	845	1.0%
1.....	188	130	372	21		2,319	8.2	5,331	9.5	7,650	9.0
2.....	191	129	378	21		2,355	8.3	5,316	9.5	7,671	9.1
3.....	191	130	483	20		2,498	8.8	5,546	9.9	8,044	9.5
4.....	188	134	577	18		2,618	9.2	5,604	10.0	8,222	9.7
5.....	183	127	577	18		2,603	9.2	5,745	10.2	8,348	9.9
6.....	180	128	575	17		2,598	9.1	5,792	10.3	8,390	9.9
7.....	151	98	562	10		2,718	9.6	5,677	10.1	8,395	9.9
8.....	141	97	447	8		2,510	8.8	5,450	9.7	7,960	9.4
9.....	96	145	242	3		1,925	6.8	2,823	5.0	4,748	5.6
10.....	71	97	172	5		1,477	5.2	2,570	4.6	3,947	4.7
11.....	73	83	173	5		1,451	5.1	2,650	4.7	4,101	4.8
12.....	73	79	178	5		1,423	5.0	2,490	4.4	3,913	4.7
No grade.....	53	78	232	88		1,554	5.5	574	1.0	2,128	2.5
Adult Education.....	7	1	3	6		117	0.4	74	0.1	191	.2
<hr/>											
Total Subject Courses.....	1,815	1,472	5,029	247		28,477					
% Subject Courses.....	6.4	5.2	17.6	0.9							
<hr/>											
Total General Courses.....	3,938	3,659	8,393	293	381			56,176			
% General Courses.....	7.0	6.5	14.9	0.5	0.7						
<hr/>											
Total Both Groups.....	5,753	5,131	13,422	540	381	28,477		56,176		84,653	
% Grand Total.....	6.8	6.1	15.9	0.6	0.5	33.6		66.4			

because materials on character education, manners, morals, and the like are included here.

and also by the steps the government is taking regarding the training of youth, we may expect the courses prepared for the upper four years of our twelve-year school system to increase in the next five years not only in number but in kind and quality.

It is interesting to note that in the separate subject matter courses the same proportion of courses appears in grades 4 and 5, namely, 9.2 per cent, and in grade 6, 9.1 per cent, but that in grade 7 this mounts slightly to 9.6 per cent. A further breakdown of Table III, which publication space does not permit here, indicates that the slight increase of subject matter courses in grade 7 is probably due to the junior high school movement.

3. There are relatively few courses for the kindergarten. Viewed in one way, this is rather amazing in that the philosophy of a great many kindergarten teachers is such that one might expect them to attempt to put on paper for the benefit of others the progressive things that they are doing. On the other hand, it is true that there are fewer kindergartens in proportion to first grades than the proportion of kindergarten courses to first grade courses indicated in Table III. It is also true that some kindergarten teachers feel rather strongly that they want no course of study for their own work.

COURSES PRODUCED IN EACH SUBJECT AREA FOR EACH GRADE

The data in Table IV reveal the following facts regarding the relative number of courses which were produced in each subject area for each grade:

1. As might be expected, there are more courses in the elementary grades in the regular fields, such as art, health and physical education, language arts, mathematics, music, social studies, and science, than there are in the high school grades. This is due to the fact that there are more subjects per grade in these fields in the elementary grades. There are more in the high school in such fields as commercial education, foreign languages, guidance (if we include grades 7 and 8 in the secondary school), home economics, industrial arts, and agriculture. There are considerably more courses in science in grade 9 than in either grades 7 and 8 or grades 10, 11, and 12. This may be accounted for, of course, by the general science movement which began a few years ago.

2. The effect of the junior high school movement can be seen in the greatly increased number of courses in grade 7 over grade 6 in such fields as foreign language, home economics, and industrial arts, and also in the beginning of courses in the field of commercial education as low as grade 7.

3. In the special classes, a much neglected field, a third of the courses are ungraded and most of the others are for the first six grades. None of these courses is for gifted pupils.

EARLIEST COURSES OF STUDY ON FILE IN CURRICULUM LABORATORY

The many courses published prior to 1924 constitute a wealth of valuable material for anyone interested in the history of American education. In Table V (page 24) are listed thirty-one of the oldest courses on file in the Curriculum Laboratory and the Teachers College Library. The oldest is the general city course for New Bedford, Massachusetts, published in 1868. The next oldest is a general state course for Kansas published in 1873. The oldest separate subject matter course is an art course published by Boston, Massachusetts, in 1876, whereas the oldest course of study in the curriculum files in sociology is as recent as 1926; in chemistry, 1925; in extracurricular activities, 1924; and in general science, 1923. There are undoubtedly older courses than those in the Curriculum Laboratory in sociology and chemistry and the Dallas, Texas, and the Colorado Springs, Colorado, courses in extracurricular activities, and probably a few older than the Los Angeles course in general science. In fact, there are probably older courses in each of the fields listed. It is surprising, however, to one who has thought of the curriculum improvement movement in terms of the last one or two decades to note how many courses were in existence prior to 1920. But, as has been indicated before, many of these were literally "courses of study" in the sense that a course was laid down on which the teacher and pupil had to run.

No special attempt was made by the Curriculum Laboratory to collect materials of historical value. All the courses appearing in Table V were received as a result of the annual requests. They have proved to be valuable, however, from the historical point of view and they will be utilized further in proposed historical studies of course of study production.

TABLE V

Dates of Publication of the Oldest Courses of Study Received by the Curriculum Laboratory, Teachers College, Columbia University, Distributed by Subject Matter Areas

Subject Matter Area	State or City	Date of Publication
Agriculture	Michigan State	1907
Art	Boston, Mass.	1876
Commercial Education	New York State	1900
Foreign Language	New York City	1902
Health and Physical Education	Indianapolis, Ind.	1904
Home Economics	Philadelphia, Pa.	1886
Industrial Arts	Washington, D. C.	1890
Language Arts:		
English	Washington, D. C.	1893
Handwriting	Terre Haute, Ind.	1899
Library	Woodstock, Vt.	1910
Reading	Brookline, Mass.	1892
Speech	Detroit, Mich.	1923
Spelling	Springfield, Mass.	1896
Mathematics	New York City	1902
Music	Terre Haute, Ind.	1897
Science:		
Biology	New York City	1902
Chemistry	Puerto Rico	1925
Elementary Science	Washington, D. C.	1884
General Science	Los Angeles, Calif.	1923
Nature Study	New Haven, Conn.	1898
Physics	Springfield, Mass.	1893
Social Studies:		
Civics	Waterbury, Conn.	1910
Economics	New York City	1912
Geography	Brookline, Mass.	1894
History	Philadelphia, Pa.	1899
Sociology	St. Louis, Mo.	1926
Special Courses	Boston, Mass.	1888
Extracurricular Activities	Dallas, Texas, and Colorado Springs, Colorado	1924
Guidance and Character Education	Philadelphia, Pa.	1901
General:		
State	Kansas	1873
City	New Bedford, Mass.	1868

CRITERIA FOR JUDGING COURSES

The large number of courses received by the Curriculum Laboratory each year made it necessary to devise a rating plan so that the better ones could be recommended to curriculum workers. All courses received since 1926 have been rated by means of criteria,⁵ and lists of judged outstanding courses of study have been issued periodically. These lists of courses have had widespread circulation, and in many

TABLE VI

Special Subject Courses of Study Received by the Curriculum Laboratory, Teachers College, Columbia University, before December 1, 1939, and Judged Outstanding

Subject Matter Area	Total Number of Courses	Number of Courses Judged Outstanding	Per Cent of Courses Judged Outstanding
Adult Education	51	7	13.7%
Agriculture.....	252	13	5.2
Art.	1,609	465	28.9
Commercial Education	613	141	23.0
Extracurricular	104	13	12.5
Foreign Language	867	188	21.7
Guidance.....	591	117	19.8
Health and Physical Education.....	3,539	684	19.3
Home Economics	1,215	317	26.1
Industrial Arts	1,203	295	24.5
Language Arts.....	6,593	1,450	22.0
Mathematics	3,277	557	17.0
Music	1,815	311	17.2
Science	1,472	488	33.2
Social Studies	5,029	1,313	26.1
Special Classes.....	247	25	10.1
Total.....	28,477	6,384	22.4%
General Courses	56,176	1,058	

⁵ The criteria utilized from 1926 to 1936 are described in Stratemeyer, Florence B. and Bruner, Herbert B. *Rating Elementary School Courses of Study*. New York: Bureau of Publications, Teachers College, Columbia University, 1926.

The criteria used since 1936 are described in Bruner, Herbert B. "Criteria for Evaluating Course of Study Materials." *Teachers College Record*, 39: 107-120, November, 1937. In addition, this article contains a description of the method in which the criteria were used. All the courses of study in the Curriculum Laboratory were evaluated or re-evaluated by means of the later criteria, which are reproduced in Appendix A.

instances the courses have been utilized by tens and hundreds of communities. Table VI shows the total number and the percentage of the special subject matter courses of study placed on the lists of outstanding courses of study up to December 1, 1939.

General courses have been omitted from this table and succeeding tables which deal with judged outstanding courses. General courses, when compared with special subject courses, have been found to contain relatively small proportions of judged outstanding courses in special subject fields. The policy, followed for approximately ten years after 1926, of rating general courses *in toto* as to their outstandingness permitted some general courses to gain the judged outstanding lists because they were outstanding in two or three subject matter fields.

In the sections of the present study which deal with science, social studies, and industrial arts, however, the general courses which contained outstanding special subject courses in these three fields have been given proportionate consideration.

COURSES JUDGED OUTSTANDING IN THE VARIOUS GRADES, BY YEARS

Table VII, which gives the distribution of subject courses by grades and years and the number judged outstanding for each, indicates:

1. A much larger proportion of recent courses than of older courses was judged outstanding. While this may be due in part to the more discriminating way in which the courses were collected from 1938 on,⁶ it will be noted that even in 1935 and 1936 the percentage of judged outstanding courses was very high, 49.1 per cent and 57.4 per cent respectively. It must be remembered, too, that the new and more exacting criteria were developed in 1937. In spite of this, however, the figures for 1937, 1938, and 1939 are still high, 55.7 per cent, 59.5 per cent, and 45.8 per cent respectively.

It is undoubtedly true that in recent years course of study materials have been decidedly superior to those produced prior to the 1930-1940 decade. In fact, materials produced from 1935 to 1940 show considerable superiority over those produced prior to that time.

⁶ The reader is reminded again that since 1937 these requests have gone only to state departments of education, to communities of 20,000 or over, and to a selected group of communities which in the years 1924-1937 had been most productive and had submitted the best materials.

2. The highest percentage of courses on the judged outstanding lists was from the kindergarten. This is due to the fact that the philosophy embodied in a great many of the kindergarten courses squares with the philosophy contained in the criteria utilized by the judges.

COURSES JUDGED OUTSTANDING IN THE VARIOUS SUBJECTS BY GRADES

The data in Table VIII regarding the courses judged outstanding in the various subjects and grades reveal that:

1. A larger percentage of science courses were judged outstanding than of courses in any other subject field. Following science are art, social studies, home economics, industrial arts, commercial education, and language arts. Each of these subjects produced approximately the same percentage of judged outstanding courses. Mathematics, music, and health and physical education follow in a lower bracket. Extra-curricular activities, special classes, and agriculture have the lowest percentages of judged outstanding courses.

It must be borne in mind that in rating the courses in any particular field the judges used the criteria merely to determine which of an existing group were in their judgment superior to the rest. For example, although 33.2 per cent of the science courses were rated as outstanding when compared with the remaining 66.8 per cent, the courses constituting the 33.2 per cent would fall far short of meeting the standards of many of our ablest and most progressive teachers in the various fields of science today.

A relatively low percentage of mathematics courses was included in the judged outstanding list. This is probably due to the fact that many mathematics courses contain little more than directions for work to be covered, and in most instances give little genuine assistance to teachers regarding the various activities and experiences that might be employed in the realm of number and quantity.

2. As might be expected, the percentage of judged outstanding courses in the first eight grades is fairly constant grade by grade. A slightly larger percentage of courses in grades 9 to 12 than of courses in the elementary school received high ratings. One factor that may have operated here is the fact that better prepared teachers, at least teachers with more than average training, produced the high school courses. It may be, too, that since the judges were dealing with a smaller

TABLE VII (Continued)

Date	JUNIOR HIGH SCHOOL										ADULT EDUCATION		SUBJECT COURSES		GENERAL COURSES		TOTAL BOTH GROUPS	
	9		10		11		12		No GRADE		J. O. No.		No		Total		Total	
	No.	J. O.	No.	J. O.	No.	J. O.	No.	J. O.	No.	J. O.	No.	J. O.	No.	J. O.	Total	J. O.	Total	J. O.
1923 and before.....	275	12	178	8	169	7	168	7	334	1	16	6,874	490	7.1%	27,932	104	34,806	594
1924.....	87	7	66	8	61	8	63	8	76	3	6	1,228	231	18.8	2,474	40	3,702	271
1925.....	99	12	75	11	75	11	73	11	52	4	6	1,368	154	11.3	2,730	55	4,098	209
1926.....	100	29	69	29	66	30	69	28	63	6	5	1,499	323	21.5	3,671	58	5,170	381
1927.....	142	21	86	7	84	6	83	5	66	10	8	1,572	219	13.9	3,904	34	5,476	253
1928.....	122	18	100	21	105	24	102	25	91	11	5	1,546	337	21.8	3,135	370	4,681	370
1929.....	111	15	83	16	77	14	78	10	85	8	1	1,346	249	18.5	2,158	54	3,504	303
1930.....	128	35	110	29	107	26	111	25	84	7	22	1,549	423	27.3	2,511	46	4,060	469
1931.....	112	42	85	25	83	30	74	26	97	5	10	1,471	508	34.5	2,361	62	3,832	570
1932.....	96	46	77	42	75	47	76	44	78	15	3	1,197	571	47.7	1,728	35	2,925	606
1933.....	94	36	78	31	79	29	78	28	59	7	2	1,207	407	33.7	1,165	101	2,372	508
1934.....	58	22	47	15	55	15	51	14	54	6	3	733	290	39.6	326	45	1,059	335
1935.....	76	37	67	32	55	30	55	25	39	12	4	803	394	49.1	230	27	1,033	421
1936.....	96	64	78	39	69	39	67	33	86	23	8	957	549	57.4	513	87	1,470	636
1937.....	70	33	70	34	68	30	69	30	73	39	2	769	428	55.7	502	98	1,271	526
1938.....	59	32	53	33	61	28	50	30	64	36		682	406	59.5	200	21	882	427
1939.....	44	20	40	16	40	15	40	18	22	14	3	448	205	45.8	7	5	455	210
1940.....	3											35					35	
No date.....	153	11	115	4	122	2	116	4	131	8	13	3,193	200	6.3	629	153	3,822	353
Total Subject Courses.....	1,925	492	1,477	400	1,451	391	1,423	371	1,554	215	117	7	28,477	6,384				
% Subject Courses Judged Outstanding.....	25.5			27.0		26.9		26.1		13.8	6.0			22.4				
Total General Courses.....																		
Grand Total.....																		

56,176 1,058

84,653 7,442

TABLE VIII

Courses of Study Received by the Curriculum Laboratory, Teachers College, Columbia University, and Judged Outstanding, Distributed by Subject Matter Areas and Grade Levels

Subject	ELEMENTARY GRADES										JUNIOR HIGH SCHOOL			
	K		1		2		3		4		5		6	
	No.	J. O.	No.	J. O.	No.	J. O.	No.	J. O.	No.	J. O.	No.	J. O.	No.	J. O.
Adult Education	12	3	5	50	7	10	10	10	10	10	8	51	10	10
Agriculture														
Art														
Commercial Education														
Extracurricular														
Foreign Language														
Guidance	11		6	6	6	8	3	9	8	6	9	6	9	9
Health and Phys.														
Education	78	24	340	58	338	60	344	58	339	60	341	59	333	56
Home Economics	2		23	16	23	2	29	2	38	2	51	2	64	2
Industrial Arts	5	2	53	16	53	16	55	16	63	16	64	14	68	14
Language Arts	65	40	660	157	677	157	685	152	681	156	675	154	672	144
Mathematics	33	13	324	59	335	61	343	68	356	64	350	61	343	56
Music	29	13	188	34	191	36	191	34	188	36	183	33	180	29
Science	16	12	130	51	129	40	130	41	134	54	127	53	128	46
Social Studies	58	38	372	100	378	125	483	124	577	128	577	133	575	137
Special Classes	2	1	21	1	21	1	20		18		18		17	
Core Curriculum														
Total Subject Courses	311	146	2,319	532	2,355	547	2,498	550	2,618	572	2,603	566	2,598	528
% Subject Courses Judged Outstanding	46.9			22.9	23.2	22.0	22.0	21.8	21.7	20.3	19.7	19.7	20.3	19.7
Total General Courses	534		5,331	5,316	5,316	5,546	5,604	5,745	5,792	5,677	5,450	5,450	5,677	5,450
Grand Total	845		7,650	7,671	8,044	8,222	8,348	8,390	8,390	8,395	7,960	7,960	8,395	7,960

TABLE VIII (Continued)

Subject	JUNIOR HIGH SCHOOL			SENIOR HIGH SCHOOL			No		ADULT EDUCATION		SUBJECT COURSES			Total General Courses	Total Both Courses Groups		
	9		No.	10		No.	11		No.	J. O.	No.	J. O.	Total			No. J. O.	Per Cent J. O.
	No.	J. O.		No.	J. O.		No.	J. O.									
Adult Education ..	26	3	25	2	25	2	25	2	37	4	51	7	51	7	13.7%	18	69
Agriculture	102	28	69	21	68	21	68	20	67				252	13	5.2	838	1,090
Art.....													1,609	465	28.9	4,043	5,652
Commercial Education	109	13	106	30	114	35	120	35	79	16	2		613	141	23.0	1,097	1,710
Extracurricular	13	4	7	1	7	1	7	1	5	2			104	13	12.5	69	173
Foreign Language ..	139	42	129	33	125	34	122	30	116	12	2		867	188	21.7	2,119	2,986
Guidance.....	55	15	34	8	33	6	34	6	73	17	1		591	117	19.8	857	1,448
Health and Phys. Education	205	46	155	39	153	40	153	41	192	23	9		3,539	684	19.3	4,913	8,452
Home Economics ..	172	56	148	53	141	50	125	40	85	7	1		1,215	317	26.7	1,163	2,378
Industrial Arts	145	35	99	28	107	36	96	31	109	20	15		1,203	295	24.5	1,749	2,952
Language Arts	340	88	241	57	235	51	230	48	265	31	16		6,593	1,450	22.0	17,045	23,638
Mathematics	133	30	119	17	109	16	108	14	75	7	3		3,277	557	17.0	5,601	8,878
Music	96	20	71	12	73	12	73	12	53	5	7		1,815	311	17.2	3,938	5,753
Science	145	28	97	26	83	10	79	21	78	28	1		1,472	488	33.2	3,659	5,131
Social Studies	242	83	172	73	173	77	178	70	232	24	3		5,029	1,313	26.1	8,393	13,422
Special Classes	3	1	5				5		88	19	6		247	25	10.1	293	540
Core Curriculum ..																381	381
Total Subject Courses.....	1,925	492	1,477	400	1,451	391	1,423	371	1,554	215	117	7	28,477	6,384			
% Subject Courses Judged Outstanding	25.5			27.0		26.9		26.1	13.8		6.0				22.4		
Total General Courses.....	2,823	2,570		2,650		2,490		574			74					56,176	
Grand Total.....	4,748	3,947		4,101		3,913		2,128		191			28,477	6,384		56,176	84,653

number of courses they included a larger percentage in the judged outstanding lists. The figures would certainly not warrant drawing the conclusion that high school courses are better than courses for the elementary grades.

COURSES JUDGED OUTSTANDING BY SUBJECT FIELDS AND YEARS

The data in Table IX regarding the courses judged outstanding, arranged according to subject fields and years, reveal that:

There is wide variation from year to year in the judges' ratings of courses in a given field. For example, in commercial education twenty-one out of twenty-three courses received for the year 1926 were judged outstanding, but only one out of twenty-five received for 1934 was so judged. Similar situations in isolated cases exist for the courses in most of the fields.

This difference is undoubtedly due in part to different standards that might have been held by each group of judges as they utilized the criteria. Since, however, all the judged outstanding courses for the years prior to 1937 were rejudged by the new criteria developed at that time, and only those courses which rated as outstanding according to the new criteria are included in the figures in Table IX, it is more than likely that courses produced in certain years are superior to those produced in others. This is understandable when one considers the large amount of imitation in course of study production. A fairly good course would certainly have its effect on subsequent courses. Furthermore, yearbooks and conferences have also had their effect in shaping courses of study around more or less uniform plans.

THE SELECTION OF COURSES FOR THIS STUDY

In selecting courses of study for detailed investigation in the present study, the following criteria were applied:

1. Areas were selected which were thought to be most promising from the standpoint of the general and the specific purposes of the investigation; for example, science, social studies, and industrial arts.

2. Preference was given to those areas for which there was available a sufficient number of courses to make the findings significant, and to those areas which were based primarily on materials of learning, such

as content or information, generalizations, principles, and concepts, rather than on specific methods designed to develop specific skills, such as the skills which are needed in penmanship and certain areas of mathematics.

3. For the specific subject matter areas selected—science, social studies, and industrial arts—the courses of study which were published between January 1, 1930, and March 31, 1938, were studied intensively.

4. Only courses of study for grades 4 to 12 inclusive were selected for study.

5. Preference was given to the courses of study included in the Revised List of Judged Outstanding Courses. It was found necessary, however, to include many additional courses in order to give adequate scope to the investigation.

6. An attempt was made to secure a well-balanced geographical distribution and to include a proportionate number of state, county, city, and village courses of study.

TECHNIQUES USED IN THE ANALYSIS OF THE CONTENT OF THE COURSES SELECTED

Preparation of the Raw Materials: Outlines of Courses

The courses of study that were finally selected for study were carefully examined to discover the most effective way of analyzing their content. In most instances it was found advisable to prepare an outline of the subject matter content of the course of study, and to outline the subject matter that was to be taught or utilized (depending upon the point of view expressed) in a specific grade during a given period of time, usually a year.

The following techniques were applied in preparing the outlines of the courses:

1. A subject matter specialist first studied each course of study in order to become acquainted with the actual content.

2. The specialist then marked the sections of the course which were to be typed. In some cases it was necessary for him to supply symbols, such as: I, representing the unit or major topic; A, the first subdivision; 1, the second subdivision; a, the third subdivision; (1), the fourth subdivision; (a), the fifth subdivision; etc. He also indicated the time devoted to each unit, when this information was available, and prepared

TABLE IX (Continued)

pertinent comments if these were needed. By using the above symbols, the specialist prepared an outline which, when typed, appeared, for example, as follows:

ILLUSTRATION 1

Unit I. Biology as Applied to Modern Life

I. How can man modify his environment through a knowledge of biology?

A. List the elements of man's natural environment

- 1.* Air
- 2.* Water
- 3.* Plants
- 4.* Temperature
- 5.* Food

B. Citation of specific examples of how man compensates for the natural environmental elements lost in his artificial environment

- 1.* Regulation of temperature and humidity of dwelling
- 2.* Ventilation
- 3.* Lighting
- 4.* Sewage disposal
- 5.* Plans for recreation
 - a.* Parks
 - b.* Playgrounds

3. A member of the project staff checked the specialist's work to ensure that both mechanical details and the material selected as representative of content were presented with as much uniformity as possible.

4. The outline of the content was typed in the form the specialist suggested, as amended or approved by the staff members.

5. The typed outline was finally rechecked with the course of study in order that the final outline should represent as faithfully as possible the content in the original course of study.

If the course of study contained an outline of the subject matter, the outline was typed *in toto* as representative of the subject matter actually taught. (See Illustration 2, page 37.) In most instances these outlines were found in sections marked "Subject Matter" or "Content," but in a few instances an outline was given under "Assimilative Material," or in sections called "Desired Outcomes" or "Objectives."

* The starred numbers were used by the specialist to indicate items in the content for which he had supplied symbols (i.e., 5 or a or b) but which had not been listed as separate items in the original outline.

ILLUSTRATION 2

SECTION OF A TYPICAL OUTLINE OF SUBJECT MATTER†

Unit I. Communication

I. How the art of preserving thought grew

A. Communication in Bible times

1. King David

a. Carrier pigeons

B. Oral tradition

1. Traditional fairy stories

2. Legends

3. Folk songs

C. Indian Communication

1. Fire and smoke signals

2. Signs

D. Picture writing

E. Sign writing

F. Phonograms

G. Hieroglyphics

H. Alphabet

1. Phoenicians

2. Romans

3. Greek

4. Arabic

II. How the material form of the book developed

A. Manuscripts

1. Kinds of material

a. Papyrus rolls

b. Parchment

c. Clay

d. Stone

e. Paper

(1) When made, how made, of what made

2. Methods of recording

a. Slaves

b. Monks

B. Printed volumes

(etc.)

† *Unit Program in Social Studies*, pp. 108-117 Topeka, Kan.: State Department of Education, 1935.

In some courses of study an outline of the subject matter could be derived only from material presented as "Problems," "Activities," "Questions for Study," and the like. In such instances an outline was made of those sections which seemed to give the best picture of the subject matter presented in the course of study. (See Illustrations 3, 4, and 5 below.) Illustration 3 gives a typical section of outline prepared from "Problems." Illustration 4 is a typical section prepared from "Activities." Illustration 5 is a typical section prepared from "Questions."

ILLUSTRATION 3

TYPICAL SECTION OF OUTLINE PREPARED FROM "PROBLEMS"†

Unit I. Problems of the Family

A. The nature and function of homemaking

1. Scope of homemaking as a vocation
 - a. Twenty-four million American homes
 - b. Ten billion dollars expended yearly
 - c. All strata of society encompassed
 - d. Common to all races of people

2. The activities of the homemaker

a. Selecting and buying

- (1)* Food
- (2)* Clothing
- (3)* Shelter
- (4)* Furnishings
- (5)* Recreation

b. Producing and using

- (1)* Food
- (2)* Clothing
- (3)* Shelter
- (4)* Furnishings

c. Training children

- (1)* Physically
- (2)* Mentally
- (3)* Morally
- (4)* Socially

d. Promoting happy family relationships

e. Safeguarding the legal and financial rights of the family

(etc.)

† *Home Economics for Senior High School*, pp. 61-64. Oakland, Calif.: Board of Education, 1932.

ILLUSTRATION 4

TYPICAL SECTION OF OUTLINE PREPARED FROM "ACTIVITIES"†

B. Safety at Play

1. Water sports

- a. Obey all rules and regulations of bathing beaches and pools
- b. Learn to swim
- c. Avoid diving in shallow water
- d. Avoid standing in boat or attempting to change seats
- e. Learn how to adjust a life belt
- f. If you can swim, do not go too far from shore, unless accompanied by a boat

2. Skating

- a. Roller skate on sidewalks or streets closed for play
- b. Ice skate on firm ice only
- c. Have holes or dangerous spots in ice clearly marked
- d. Know how to rescue one who has fallen through ice
- e. When returning from skating, put skates in place provided for them

3. Coasting

- a. Coast in parks or on streets closed to traffic and blocked at end to prevent coasting into traffic
- b. Avoid hooking onto trucks, wagons, and cars
- c. When returning to the top of the hill, walk on the extreme right

(etc.)

† *Tentative Course of Study in Health Education*, p. 3. Perth Amboy, N. J.: Board of Education, 1937.

ILLUSTRATION 5**TYPICAL SECTION OF OUTLINE PREPARED FROM "QUESTIONS"†**

Unit I. What European conditions resulted in the coming of Europeans to America, and what are the main geographical features of the continent they found?

A. How were European conditions acting as causes which resulted in new discoveries and explorations?

1. Why were new routes needed in trading with the East?
2. How did inventions and political developments aid in exploration?
3. How did Columbus come to be the discoverer of America?
4. How was America named?
5. What did other Spaniards and Portuguese achieve?
6. What were the English, French, and Dutch doing?
7. Why did many people wish to live in America?

B. What important geographical features were to help or hinder the exploration, settlement, and development of this newly found land?

1. How do the important land forms influence human activity?
2. What are the names and locations of the more important rivers, lakes, mountains, harbors?
3. How have the influences spoken of above been exemplified in the development of the United States?
4. What are the main divisions of the United States?
 - a.* What are their occupations?
5. What natural conditions have influenced man's life in America?

(etc.)

† *Course of Study for Social Science Junior High School*, pp. 14-21. Pasadena, Calif : Board of Education, 1932.

In a few instances it was necessary to develop an outline of subject matter by bringing together material from several parts of the course of study. For example, in one course of study the content actually used by the school was found by examining material under "Specific Objectives," "Suggested Activities," "Suggested Procedures," and "Desirable Outcomes," which had been set up in four parallel columns. In order to prepare an outline representing *all* of the subject matter as defined above, it was necessary to select material from each column and to organize it in an outline which conformed with the general pattern of the other outlines. Illustration 6 (page 41) shows a section of a course of study using parallel columns, and Illustration 7 (page 42) shows a section of the outline prepared from this material.

ILLUSTRATION 6

EXCERPT OF A COURSE OF STUDY IN WHICH CONTENT OCCURS IN SEVERAL SECTIONS†

(See also Illustration 7)

<i>Specific Objectives</i>	<i>Suggested Activities</i>	<i>Suggested Procedure</i>	<i>Desirable Outcomes</i>
To know how magnetism acts	Experiment with loadstones Experiment with permanent magnets Experiment with electromagnets	Explain and demonstrate: The magnetism of the earth Loadstones The compass The polarity of magnets The action of permanent magnets The action of electromagnets	Direct: Knowledge of the presence of magnetism
To know how magnets are made	Make a temporary magnet	Explain and demonstrate: How magnets are made Making a magnet of pocketknife and screw driver Making electromagnets	Ability to make a magnet Indirect: Appreciation of the nature and practicability of magnetism and electricity
To know the uses of magnets in home appliances	Take an old telephone apart Examine an old wattmeter Examine an old voltmeter Examine an old electric bell Take an old washer motor apart Examine an old radio loudspeaker Examine an old radio headphone Examine a toy train	Explain the function of magnets in home appliances, toys, automobiles, dash meters, motors, generators, and magnetos	Direct: Knowledge of uses of magnets in home appliances

† *Manual Arts*, pp. 26-27. St. Louis, Mo.: Board of Education, 1930.

ILLUSTRATION 7

TYPICAL SECTION OF OUTLINE PREPARED FROM
SEVERAL PARTS OF A COURSE†

(See also Illustration 6)

- I.* Magnetism
 - A.* The magnetism of the earth
 - B.* Loadstones
 - C.* The compass
 - D.* The polarity of magnets
 - E.* The action of permanent magnets
 - F.* The action of electromagnets
- II.* Magnets
 - A.* How magnets are made
 - B.* Making a magnet of pocketknife and screw driver
 - C.* Making electromagnets
- III.* Use of magnets in home appliances
 - A.* Toys
 - B.* Automobile dash meters
 - C.* Motors
 - D.* Generators
 - E.* Magnetos
 - F.* Telephone
 - G.* Wattmeter
 - H.* Voltmeter
 - I.* Electric bell
 - J.* Washer motor
 - K.* Radio loud-speaker
 - L.* Radio headphone
 - M.* Toy train

† Adapted from *Manual Arts*, pp. 26-27. St. Louis, Mo.: Board of Education, 1930.

In the case of a limited number of courses it was necessary to *brief* materials written in essay form in order to obtain an outline which would conform to the general pattern. In these instances, as in the previous case, extreme care was exercised that the actual subject matter should not be warped or misconstrued in the attempt to reorganize it in outline form.

In a very few instances, when the course of study included more content of a detailed nature than could be effectively outlined and used, only the principal headings of the course were used and in the comment column which was kept with each outline a note was placed to the

effect, "Outline not developed in detail: for additional treatment see course of study." In the detailed analysis of the content of these courses of study, it was then necessary to refer to the courses of study.

While the outlines thus prepared are based on several techniques, a sufficient degree of uniformity was maintained to ensure comparability of the data.

Analysis of the Raw Materials

Because of the nature of the materials used in this investigation, it was impracticable—had it been desirable—to utilize many of the statistical techniques of research. While the materials in some areas, for example, mathematics, would lend themselves to certain statistical techniques of analysis, materials in science and social studies cannot in the main be analyzed statistically. Any attempts to weight the content of courses of study statistically proved futile because it was found impossible to construct a formula by which this weighting could be accurately done.

On the other hand, every precaution was taken to ensure the accuracy of the data. All interpretations of the findings of this study are based on firsthand examination of materials by specialists and persons carefully trained for the different tasks.

The primary purpose of presenting the various steps in the analyses of the raw data is to show the relationships which exist among and within grades and among and within subjects, and the interrelationships which exist among the various combinations of grades and subjects. These relationships are shown from various points of view, as will be seen in succeeding sections.

Preparation of Unit-Topic Charts

The first step in analyzing the raw data was to prepare for each grade in each subject a unit-topic¹³ chart which would present the units and

¹³ For the purpose of this investigation a *unit* was defined as a major block of subject matter or content to be used in teaching a given subject in a limited amount of time. A *topic* was defined as a segment of a unit; it might be included in a number of units but is seldom studied as extensively as a unit. In attempting to differentiate between units and topics certain general criteria were kept in mind by the investigators:

(1) The major divisions of a course of study, usually from six to twenty, were considered units whether so designated or not by the course of study writer, while the major subheadings under each unit, usually from two to a dozen or more, were considered topics.

(2) Units and topics were often given their designation by means of general terms or phrases suggested by the content of the particular segment of subject matter under con-

major topics found in each outline. (See Table X.) In preparing the unit-topic charts each subject area except industrial arts was treated separately for each grade, grades 4 to 12 inclusive. In industrial arts various subjects, such as woodwork and metal work, were treated separately for the junior high school and the senior high school, regardless of the specific grade, which in many courses of study was not stated. In the senior high school, such subjects as world history, modern problems, chemistry, and biology were treated separately.

In constructing the unit-topic charts the names of communities submitting the courses were placed at the top of the chart and the various units or major topics were listed at the left. The major topics were limited primarily to those which assumed the position either of the title of a unit or a topic heading in one or more of the courses of study, or of the first subdivision under such a unit or a topic heading. Therefore many minor topics which appeared in the second, third, fourth, and fifth subdivisions of these outlines do not appear on the unit-topic charts. In other words, these charts show only the units or major topics found in the courses of study.

A symbol for each title of a unit-topic heading, or first subdivision, was placed in the appropriate place on the chart, together with the total number of items in the outline devoted to a discussion of that particular unit or topic.

It is apparent that in many cases those who prepared the original courses of study paid little attention to standard practices in their choice of symbols for outlining. Consequently, it frequently was found that major topics were marked by symbols generally used to indicate items of third or perhaps a lower rank. For example, in a course of study for physics the outline shown on page 45 was found. In this outline the unit title is designated by "IV," and the first subdivision by "a." In charting this outline the original symbols were used to designate the unit title and the first breakdown so that later these items could be quickly located in the original course of study by anyone using the unit-topic charts. After all the courses in a given grade had been

sideration rather than by the phraseology used by the course of study writer. This plan was followed in order to get a common phraseology and to make possible necessary comparisons. For example, such a phrase as "How America was discovered and explored by the Europeans" was changed to "Period of discovery and exploration." Often it was necessary to study the unit or topic in some detail to discover what actually was being treated. This does not mean, however, that a course of study was ever forced to fit a particular pattern. Any unit or topic which would not fall naturally under an established pattern was treated as a new unit or topic.

charted, totals were placed in the column following the list of units and topics at the left-hand side of the chart. A portion of the unit-topic chart for grade nine will illustrate this. (Table X, p. 48.)

ILLUSTRATION 8

Unit IV. Expansion and the Measurement of Heat and Temperature

a. Expansion and contraction:

- (1)* Thermometers
- (2)* Construction work
- (3)* Thermostatic control
- (4)* Expansion of air
- (5)* Expansion of liquids

b. Specific heat:

- (1)* Different materials, as iron, aluminum, copper, etc., hold different quantities of heat
- (2)* Unit quantity of heat, the calorie and the B.T.U.

Table X includes only those courses which contain a unit on "Air." The numbers and letters in the vertical and the horizontal columns were obtained in the following manner:

First, the letters, sub-letters, and numbers not enclosed in circles are the identifying marks of topics and subtopics used in the various courses of study. For example, under Course E and opposite the subtopic "Health" will be found II F. This means that "Health" appeared under Unit II, "Air," as subdivision F. Under Course A opposite the subtopic "Oxygen and Oxidation" is VIII 2, 6. This means that "Oxygen and Oxidation" appeared under Unit VIII, "Air," as subdivisions 2 and 6. The numbers in the circles are the total numbers of items listed under the subdivision. For example, in "Health" II F 4 the 4 in the circle means that there were four items included under the subdivision "Health" II F; for "Oxygen and Oxidation" A VIII 2, 6 (ni) no items were found under either of the subdivisions, therefore "ni," meaning "no items," was placed in the circle to indicate this fact. The letters and numbers under each of the courses opposite the unit "Air" are similar to the identifying marks for that unit in the original course of study and the total number of items in the unit. An illustration taken from Course K will show what is meant by an item and how the item counts were obtained. (Illustration 9, p. 46.)

Subdivision C in this unit, "Composition of Air," has under it three other subdivisions, one of which is further subdivided. In this case as in similar cases, the three divisions, 1. Elements, 2. Water vapor, 3.

Dust, as well as all of its subdivisions, 1a. Properties, 1b. Use, 1c. Proportion in Air, were considered as items and therefore were counted as such. In this particular instance there were six items. Therefore the sym-

ILLUSTRATION 9

EXCERPT FROM COURSE K

Unit III. Air and Man's Use of It

A. Extent of atmosphere

1. Densest near the earth
2. Becomes more rare as elevation increases

B. Work of air

1. Due to its properties
2. Use of ordinary air pressure
3. Use of compressed air

C. Composition of air

1. Elements
 - a. Properties
 - b. Use
 - c. Proportion in air
2. Water vapor
3. Dust

D. Elements, compounds and mixtures

1. Definition of each
2. Formation of compounds and mixtures
 - a. Chemical changes
 - b. Physical changes

bol IIIC with the number 6 enclosed in a circle was placed in the column headed "Course K" opposite the subtopic "Composition." This line in the table should be read: Subtopic "Composition" occurs under Unit III, "Air," as subdivision C in Course K and contains six items. A further examination of the excerpt from Course K will show similar procedures used with respect to this particular unit.

Second, the letters found in the various columns opposite the name of the topic or unit are the identifying marks for that topic or unit as given in the typed outline made from the original course of study. The number in each circle in the columns opposite "Air" is the total number of items for a particular unit in each of the courses of study represented. These totals include all items found in a unit, all the items under its subdivision, and all items under its subdivisions that are not marked by a symbol. Occasionally it seemed inadvisable to include in the chart some subdivisions found under certain units, either because

of the general nature of the subdivisions or because they seldom occurred. As a result, in counting the total items in the column headed "Course J," for example, the unit total 106 will be larger than the sum of the items included as subtopics under the unit. Therefore, the total of units found opposite the name of each topic or unit may be equal to or greater than the total of the items listed in that column.

Third, the column "Totals" presents three totals, which have been placed in the form of an artificial fraction. In this report each such artificial fraction is called an "Index of Significance." These indexes were obtained and listed for each major topic and each subtopic. They were derived directly from the unit-topic chart, after the units and subtopics from all the courses of study examined had been included in the chart. For example, in the index of significance 11:716/22, found in the column "Totals" opposite "Air" (Table X), the number 11 to the left of the colon represents the total number of courses which contain a unit on air. This number was obtained by counting the courses which contained the unit "Air" as shown in the horizontal column to the right of the major topic "Air." The 716 represents the total number of items on "Air" found in all the courses which contained the unit "Air." This number was obtained by adding all the letters and figures in the horizontal column to the right of the major topic "Air," including the numbers in the circles.¹⁴ The 22 following the slant bar is the total number of science courses for grade 9 which were analyzed for this study. The index of significance 11:716/22 should be read as follows: 11 courses of the 22 which were examined contained a unit or major topic on "Air" and a total of 716 items were devoted to a discussion of this particular unit or major topic.

The indexes of significance for each of the subtopics were obtained similarly, that is, all letters and all numbers in the horizontal columns to the right of each subtopic were added to obtain the total number of items for each subtopic. Thus an arbitrary count was made of all letters and numbers in each of the horizontal columns to the right of the subtopic, even though it was known that some duplication would be involved. Counting the unit symbol, which in this case represents "Air," for each of the subtopics whenever it occurred, and counting the symbol for the subtopic when this symbol occurred opposite more than one subtopic constituted the duplication. For example, in Table X in the column "Course H," the symbol "II" is counted in each of

¹⁴ In all instances the unit or major topic was counted as one item.

TABLE A
EXCERPT FROM NINTH GRADE UNIT-TOPIC CHART

	Course A	Course B	Course C	Course D	Course E	Course F	Course G	Course H	Course I	Course J	Course K	Totals
Air.....	VIII (8)	II (44)	I (22)	B (106)	II (71)	VIII (33)	II (81)	II (98)	III (15)	II III A (106)	III (19)	11:716/22
Action of.....	VIII (ni) ⁴					VIII IV (5)			III 1, 3 (4)		III B (3)	4:21/22
Atmosphere.....						VIII III (3)					III A (2)	2:29/22
Composition.....			I (5)		II C (12)	VIII II (2)				III B (12)	III C (6)	5:47/22
Elements, Compounds and Mixtures.....											III D (4)	1:6/22
Fire.....										III C (5)		1:7/22
Health.....					II F (4)	VIII IX (ni)		II VII (9)		III D (27)		4:48/22
Historical.....	VIII (ni) ⁸				II A (6)							2:10/22

* ni means no items or sub-topics.

the subtopics and the symbol "IV," representing a subtopic, is counted where the total of each subtopic occurs. In this particular instance "IV" is found in two of the charted subtopics and therefore "IV" has been counted for "Sound" and also for "Uses." Here an error is introduced in the count of the total number of items for each of the subtopics, but it was felt that the procedure was justified because in most instances it would give a better indication of the actual number of items devoted to that subtopic. For example, in the illustration just given "IV" refers both to "Sound" and to "Uses" and therefore should be counted in both places. It will be noted that the total number of items for the unit "Air" in the vertical column "Totals" cannot be obtained directly by adding the item count for each subtopic. In all instances the sum of the items for each subtopic (e.g., "Action of," "Atmosphere," etc.) will be greater than the total number of items for the unit or major topic (in this case "Air") found in the vertical column. This apparent discrepancy occurs, of course, as a result of the duplication in estimating the subtopic total in the manner discussed above. This total is the sum of the items in the horizontal column rather than the sum of the items in the vertical column which it apparently heads.

INDEXES OF SIGNIFICANCE OF UNITS OR MAJOR TOPICS BY GRADES

The next major step was to prepare tables to show the indexes of significance of units or major topics for each grade according to subject. Table X, page 48, gives a portion of such a table taken from general science in grade 9. These tables were made from the unit-topic charts and were prepared prior to the construction of a master unit-topic chart for each subject matter area, such as science, social studies, and industrial arts. Besides being utilized in the preparation of the master unit-topic charts, the tables of indexes of significance serve other purposes. They show clearly those units or major topics most often found in the various courses of study and also reveal something of the manner in which these various topics were organized.

The master unit-topic charts were constructed after all tables of indexes of significance and the unit-topic charts had been completed. All grades or subjects within each major area, such as social studies or science, were treated together; that is, one master unit-topic chart was prepared for science, one for social studies, one for industrial arts, and

TABLE XI

Excerpt from Table; Indexes of Significance of Science Major Topics by Grades

Major Topic	INTERMEDIATE			Total
	4	5	6	
Acceleration.....				
Acids, Bases, Salts.....				
Acids, Organic.....				
Adaptation and Control.....		2:93/15		2:93/41
Aeronautics.....				
Garden.....	3:40/14	4:92/15	2:10/12	9:142/41
Gases.....			1:6/12	1:6/41
Gas Laws.....				
Gay-Lussac's Law.....				
Machines.....	1:11/14	3:39/15	1:7/12	5:57/41
Magnesium.....				
Magnetism.....				
Magnetism and Electricity.....	8:109/14	3:102/15	2:20/12	13:231/41
Weather.....	2:91/14	1:23/15		3:114/41
Weather and Climate.....	2:20/14	5:63/15	5:50/12	12:133/41
	JUNIOR HIGH SCHOOL			Total
	7	8	9	
Acceleration.....				
Acids, Bases, Salts.....			1:132/22	1:132/62
Acids, Organic.....				
Adaptation and Control.....	3:22/18	4:78/22	3:76/22	10:176/62
Aeronautics.....	1:6/18	4:32/22	4:32/22	9:70/62
Garden.....	4:17/18	5:279/22		9:296/62
Gases.....			1:12/22	1:12/62
Gas Laws.....				
Gay-Lussac's Law.....				
Machines.....	1:3/18	10:243/22	13:692/22	24:938/62
Magnesium.....				
Magnetism.....	2:10/18		1:3/22	3:13/62
Magnetism and Electricity.....	2:30/18	3:371/22	12:1001/22	17:1402/62
Weather.....	1:9/18		2:15/22	3:24/62
Weather and Climate.....	6:463/18	12:545/22	6:279/22	24:1287/62

TABLE XI (*Continued*)

Major Topic	SENIOR HIGH SCHOOL			Total	Grand Total
	Biology	Chemistry	Physics		
Acceleration			2:7/8	2:7/29	2:7/132
Acids, Bases, Salts		8:453/12		8:453/29	9:585/132
Acids, Organic		6:88/12		6:88/29	6:88/132
Adaptation and Control	7:293/9			7:293/29	19:562/132
Aeronautics					9:70/132
Garden	1:40/9			1:40/29	19:478/132
Gases		2:19/12	4:69/8	6:88/29	8:106/132
Gas Laws		11:201/12		11:201/29	11:201/132
Gay-Lussac's Law		3:11/12		3:11/29	3:11/132
Machines			5:122/8	5:122/29	34:1116/132
Magnesium		2:109/12		2:109/29	2:109/132
Magnetism			7:72/8	7:72/29	9:85/132
Magnetism and Electricity . .			8:614/8	8:614/29	38:2247/132
Weather		1:2/12		1:2/29	7:140/132
Weather and Climate					36:1420/132

so on. Table XI, page 51, is an excerpt from the master unit-topic chart for science. The purpose of the master unit-topic chart is to show, first, the general scope and sequence of the area; second, the emphasis given the various units and subtopics of each area by each grade; and third, the overlapping of materials.

In general, the following procedures were utilized in the construction of the master unit-topic chart for each of the major areas included in this study. First, a list of units and major subtopics was developed which combined the outlines of the various unit-topic charts in a given area, as shown in the various tables of indexes of significance for that area. Second, the totals (indexes of significance) of the unit-topic charts of the tables of indexes of significance were transferred to the master unit-topic chart, and arranged according to grade levels or subjects represented in the unit-topic charts. For example, "Acceleration," with an index of significance of 2:7/8, occurred only in physics; therefore the index of significance 2:7/8 was placed under "Physics" opposite "Acceleration." "Adaptation and Control" was found in science courses of study in the fifth, seventh, eighth, and ninth grades and in biology; therefore the indexes of significance for this topic for each of the grades were placed in the appropriate columns.

Third, the totals for all units and major subtopics were then found by adding the indexes of significance in the various horizontal columns. In science, four totals were prepared for each topic (see Table XI, page 51): a total for intermediate school science, a total for junior high school science, a total for senior high school science, and a grand total for all grades. These totals were derived by simple addition; all the numbers to the left and to the right of the colon were added separately and formed the numerator of the artificial fraction in the total column. Similarly, all numbers below the line were added to form the denominator of the artificial fraction in the total column. To illustrate: Opposite the topic "Adaptation and Control" the following indexes of significance for the seventh, eighth, and ninth grades are found: 3:22/18, 4:78/22, and 3:76/22, with a total index of significance of 10:176/22. The 10 in this fraction was obtained by adding 3, 4, and 3; the 176 was obtained by adding 22, 78, and 76. The 62 was obtained by adding 18, 22, and 22. The index of significance in the grand total column was obtained by adding together all the indexes of significance in the subtotal columns. The index of significance 19:562/132 found in the grand total column opposite "Adaptation and Control" should be read as follows: The topic "Adaptation and Control" occurred in 19 of the 132 courses of study examined and contained a total of 562 items.

The master unit-topic chart, then, is a summary of all the unit-topic charts within a given area. In the master unit-topic charts, the topics and subtopics appearing in the unit-topic charts for the various grades and subjects in each area have been combined into a list of somewhat general topics and subtopics, each with its appropriate index of significance.

S U M M A R Y

The specific procedures and techniques employed in this study included the selection and evaluation of courses of study, the preparation of raw materials in the form of typed outlines for courses of study selected, and the conversion of these data into unit-topic and master unit-topic charts. The courses of study selected were taken from the collection of the Curriculum Laboratory of Teachers College, Columbia University. The courses had been evaluated over a period of years according to two sets of criteria which had been worked out in the Curriculum Laboratory. The typed outlines of the courses selected were

prepared through the cooperative efforts of various specialists and the project staff. The unit-topic charts and the master unit-topic charts were also in large part the work of the various specialists who had the cooperation of the project staff. These charts are the results of the analysis of the outlines. The novel feature of the techniques employed in the analysis of the raw materials was the invention and use of what is called here an "index of significance." Although this index of significance is quantitative, it did not lend itself to exact statistical treatment. Despite the lack of this desirable characteristic, the index was found to have real value and significance, especially in terms of the purposes of this study. The succeeding chapters describe in detail the application of the techniques already discussed to the three subject matter areas included in this investigation—science, social studies, and industrial arts. The final chapter contains some general suggestions and conclusions emerging from the study as a whole.

CHAPTER III

Analysis of Selected Courses of Study in Science

THE Curriculum Laboratory at Teachers College, Columbia University, has been a depository for courses of study in science for the past fifteen years. The distribution of these courses by grade levels and dates of publication is shown in Table XII (page 57).

SCIENCE COURSES OF STUDY AVAILABLE FOR THIS STUDY

If it can be assumed that the courses received by the Curriculum Laboratory are representative of course of study materials for science, then the data given in Table XII suggest the following trends:

1. More than one-fifth of the separate subject courses in science were published before 1924, and more than half of the science courses contained in general courses of study were published prior to that time.

2. The total number of courses of study received per grade is approximately the same for the first six grades for both separate subject courses and general courses. There is a rather sharp decrease in the number of courses for grades 7 and 8. There are in grade 9 more separate subject courses than in any other of the twelve grades. This is to be expected because of the general science movement. In the senior high school (biology, chemistry, and physics) the number of courses received was approximately the same as the number received for grades 7 and 8.

If it can be assumed that the number of courses per grade received in the Curriculum Laboratory is roughly in proportion to the number produced in the country at large per grade, it would appear that for the first six grades we produce about the same number of courses per grade. In addition, an examination of these courses indicates that in the main the same kind of plan is used in producing courses for each of the first six grades.

Grades 7 and 8 seem to be another unit, with the number and kinds of courses being about the same for two grades. In grade 9 there is a somewhat different picture for the reason that many of these courses are regarded as one-year introductory courses in science. In the senior high school we find special subject courses in science, such as biology, chemistry, and physics. So few courses were received for the kindergarten that they have not been considered here.

3. From 1924 to 1932 inclusive the number of separate subject science courses received has been fairly constant year by year, with the exception of 1925. There was a considerable drop in the number produced in 1933, 1934, and 1935, a decrease undoubtedly due to the depression. The figure rose again in 1936 and would probably continue to rise through 1940. (See the discussion in Chapter II regarding the availability of courses for the years 1938-1940.)

While the fact is not evident from Table XII, actual examination of the courses of study in science for the elementary schools indicated a trend toward the production of science courses which included subject matter from several fields of science. All the tenth grade courses analyzed were courses in biology and all the eleventh and twelfth grade courses were courses in either chemistry or physics.

EVALUATION OF SCIENCE COURSES OF STUDY

As was the case with all the courses of study received by the Curriculum Laboratory, the science courses have been evaluated periodically and the better ones placed on a List of Judged Outstanding Courses of Study. Criteria developed in 1926¹ were used in judging the merits of courses received between 1923 and 1935. Because of the changing trends in education and in course of study improvement, these criteria were revised in 1937.² The revised criteria have been used not only in judging the 1936 and 1937 courses but in rejudging all the courses judged outstanding in accordance with the older criteria. In this way, obsolete and revised courses were removed from the earlier cumulative lists of courses judged to be outstanding.

¹ Stratemeyer, Florence B. and Bruner, Herbert B. *Rating Elementary School Courses of Study*. New York: Bureau of Publications, Teachers College, Columbia University, 1926.

² Bruner, Herbert B. "Criteria for Evaluating Course of Study Materials." *Teachers College Record*, 39:107-120, November, 1937. See Appendix.

TABLE XII

*Courses of Study in Science Received by the Curriculum Laboratory, Teachers College, Columbia University,
Distributed by Grade Levels and Dates of Publication*

Date	K	1	2	3	4	5	6	7	8	9	Biol- ogy	Chem- istry	Physics	No Grade	Total Sub.	Total Gen.*	Grand Total
1923 and before....	3	39	39	40	40	37	36	25	22	10	8	6	5	12	322	1,991	2,313
1924.....		5	5	5	6	4	4	5	5	9	4	4	4	2	62	141	203
1925.....		4	4	4	3	4	3	3	1	4	1	2	2	5	39	152	191
1926.....	2	5	5	5	5	5	5	1	1	5	5	4	6	3	57	186	243
1927.....	1	7	7	7	7	7	7	4	5	14	8	7	6	3	90	206	296
1928.....	1	8	8	8	9	9	9	5	3	12	7	7	7	3	96	239	355
1929.....	2	6	6	4	4	4	4	5	3	3	5	5	9	3	61	149	210
1930.....	1	4	5	5	5	5	5	3	3	11	4	5	7	3	66	137	203
1931.....	1	9	9	9	9	9	9	1	2	9	7	2	1	6	83	130	213
1932.....	1	9	8	7	8	8	8	5	5	10	6	3	4	5	87	76	163
1933.....	1	2	2	3	3	4	2	3	2	11	3	4	3	2	44	75	119
1934.....	1	4	4	5	5	4	4			4	1	2	1	3	38	27	65
1935.....	1	1		2	2	1	1	5	6	11	8	5	4	3	48	15	63
1936.....	1	7	7	7	7	7	7	5	4	6	9	6	5	5	83	28	111
1937.....		5	5	5	7	7	9	4	4	6	7	4	6	4	73	17	90
1938.....					1	1	1	17	18	7	5	3	1	2	56	10	66
1939.....		2	2	2	3	3	3	2	3	2	3	3	2	2	32		32
No date.....	1	13	13	12	10	9	10	8	11	11	6	11	6	14	135	60	195
Total Subject Courses	16	130	129	130	134	127	128	98	97	145	97	83	79	79	1,472		
Total General Courses	48	348	346	369	355	340	337	298	279	223	199	235	238	45		3,659	
Grand Total.....	64	478	475	499	489	467	465	396	376	368	295	318	317	124			5,131

* As indicated in Chapter I, the general courses (a course including several subjects in one volume was called *general*) were in the main quite inferior to the separate subject courses. This was particularly true in the field of science. Note the rapid decrease in the number of general courses published in the last ten years. A breakdown showing the number of general courses by grades and years has not been produced here because so few of the general courses were thought worthy of analysis for this investigation.

The number and percentage of science courses that have been judged outstanding at one time or another are shown in Table XIII. An

TABLE XIII

Courses of Study in Science Received by the Curriculum Laboratory, Teachers College, Columbia University, Distributed by Dates of Publication and Number and Percentage Judged Outstanding

Date of Publication	Number of Courses	Number of Courses Judged Outstanding	Per Cent of Courses Judged Outstanding
1923 and before.....	322	26	8.1%
1924.....	62	10	16.1
1925.....	39	11	28.2
1926.....	57	16	28.1
1927.....	90	30	33.3
1928.....	96	39	40.6
1929.....	61	12	19.7
1930.....	66	23	34.8
1931.....	83	59	71.1
1932.....	87	34	39.1
1933.....	44	35	79.5
1934.....	38	31	81.6
1935.....	48	15	31.3
1936.....	83	41	49.4
1937.....	73	49	67.1
1938.....	56	37	66.1
1939.....	32	13	40.6
No date.....	135	7	5.2
Total.....	1,472	488	33.2%

analysis of this table indicates the following trends in the evaluation of separate subject science courses of study:

1. The percentage of courses of study in science judged to be outstanding from year to year has varied from 5.2 per cent of those having no date and 8.1 per cent of those published before 1924, to 81.6 per cent of those for 1934 and 79.5 per cent of those for 1933.

2. The percentage of courses judged outstanding has been considerably larger since 1930, with the exception of the years 1932 and 1935. There is little question that in the main the materials in science published since 1930 have been superior to those published prior to that date.

The fact that more elementary courses have been judged outstanding since 1930 than before is probably indicative of general improvement in the quality of courses of study for elementary science. The fact that so few secondary courses have been judged outstanding may be largely attributed to the apparent lack of any great amount of activity in the construction of courses of study at this level.

SELECTION OF COURSES FOR THIS STUDY

This study was based chiefly on courses published between January 1, 1930, and March 31, 1938. Most of the courses received since March 31, 1938, which have been examined somewhat less critically, reveal no significant departure from the general plan of the courses received earlier, though a few exceptions were noted. For example, one course reflected markedly the influence of a recent report of the science committee of the Progressive Education Association.³

In selecting the courses of study in science to be included in this investigation the following criteria were used:

1. Only courses of study for grades 4 to 12 were included.
2. Preference was given to the courses of study which appeared on the Revised List of Judged Outstanding Courses. In many instances, however, it was found necessary to include additional courses in order to get sufficient range to ensure representativeness.
3. In order to ensure a representative sampling of the courses of study produced in the United States, the final list was so selected as to include (a) typical state courses, (b) courses from centers with large populations, and (c) courses from different geographical areas. Some of these courses had not been included in the lists of those judged to be outstanding.

The courses finally selected represented cities and towns located from California to New York and from Texas to Michigan. About one half of them satisfied the criteria for the Revised List of Judged Outstanding Courses. Sixty-one (46 per cent) of the courses were published between 1930 and 1932, forty-one (31 per cent) between 1933 and 1935, and thirty (23 per cent) between 1936 and March 31, 1938. The names and locations of communities represented by the 132 courses included in the investigation are given in Table XIV.

³ *Science in General Education*. Report of the Commission on Secondary School Curriculum of the Progressive Education Association. New York: D. Appleton-Century, 1939.

TABLE XIV

Science Courses Included in This Study, Distributed by Grade Level and Geographical Location

Course	GRADE						Biology	Chemistry	Physics	Total
	4	5	6	7	8	9				
Arkansas,										
Fort Smith, 1932...								1		1
California,										
Fresno, 1932... ..	1	1	1							3
Long Beach, 193 ...			1							1
Los Angeles, 1935..					1	1				2
Oakland, 1932.....				1	1	1				3
Pasadena, 1932					1		1	1	1	4
Colorado										
State, 1936	1	1								2
Denver, 1931				1	1	1				3
Connecticut,										
Hartford, 1935				1	1					2
Delaware,										
Dover, 1934				1	1					2
Hawaii				1	1		1			3
Idaho										
State, 1936.....		1				1	1	1	1	5
Illinois										
Chicago (Univ.),										
1933-34							1	1	1	3
Indiana										
State, 1931.....				1	1					2
Indianapolis, 1935..				1	1	1				3
Richmond, 1932 ..					1	1				2
Iowa										
State, 1932 . . .							1		1	2
Council Bluffs, 1936	1			1	1					3
Des Moines, 1933 ..	1	1	1							3
Kentucky										
State, 1931.....			1							1
Maryland										
State, 1933	1	1	1							3
Allegany County,										
1932.	1	1	1							3
Baltimore, 1933....						1				1
Massachusetts,										
Malden, 1936					1	1				2
Michigan,										
Grand Rapids, 1931.	1									1
Flint, 1931.....		1								1

Courses in Science

61

TABLE XIV (Continued)

Course	GRADE						Biol- ogy	Chem- istry	Physics	Total
	4	5	6	7	8	9				
Minnesota										
State, 1932.....				1	1	1				3
Missouri,										
Kansas City, 1930 .	1	1	1			1				4
Montana										
State, 1934.....				1	1	1				3
New Jersey,										
Jersey City, 1933 .						1				1
New Brunswick,										
1936.....						1				1
New York										
State, 1935 . . .	1	1	1	1	1	1		1		7
Ithaca, 1931 . . .				1	1					2
New Rochelle, 1935	1	1	1							3
Rochester, 1930 . .				1	1	1		1		4
Ohio										
State, 1930 . . .						1				1
Cleveland, 1930 . .				1	1	1	1	1	1	6
Lakewood, 1932 . .				1				1		2
Oklahoma										
State, 1931... . .						1	1	1	1	4
Oregon										
State, 1937... . .							1	1	1	3
Pennsylvania										
State, 1933				1						1
Philadelphia, 1931 .					1	1				2
Pittsburgh, 1931 . .								1		1
Philippines,										
Manila, 1930.. . .						1				1
South Carolina										
State, 1936	1	1	1							3
South Dakota,										
Aberdeen, 1936 . .	1	1								2
Texas,										
Austin, 1931 . . .	1									1
Fort Worth, 1934 .	1	1	1	1	1	1	1	1	1	9
West Virginia,										
Morgantown, 1936..				1	1					2
Wisconsin,										
Madison, 1937	1	1	1							3
Milwaukee, 1932 . .					1					1
Shorewood, 1935 . .		1								1
Total.....	15	15	12	18	22	21	9	12	8	132

TECHNIQUES USED IN THE ANALYSIS OF SCIENCE COURSES

The first step in the analysis of the content of these courses was the preparation of outlines of the subject matter of each course of study.⁴

Typed outlines of the subject matter of each course, prepared by a subject matter specialist and various members of the project staff, constituted the basic materials used in further analysis. The essential requirement in preparing all outlines was that they should faithfully represent the content of the original course of study. The second step was to prepare for each grade included in the study a unit-topic chart on which were listed the units and major topics found in each outline. The techniques employed in this and the subsequent steps of the procedure have already been described in Chapter II. The third step was to list, from the unit-topic charts for each of the grades and subjects reported in this study, the major topics and subtopics, together with their "indexes of significance." The fourth step was to construct a master unit-topic chart which combined the topics and subtopics from the unit-topic charts prepared for the separate grades.

SUBJECT MATTER IN SCIENCE COURSES

The attempt to determine the subject matter of science for grades 4 to 9 and of biology, chemistry, and physics for the senior high schools involved the construction of unit-topic charts, as described in Chapter II. These charts showed the units, or major topics, found at each grade level, together with the most important subtopics under each unit topic or major topic.

An examination of the units and major topics of the various grades to determine whether they indicated a definite sequence of material revealed that no such sequence existed except in physics. For this reason all units and major topics for each grade except "Introductions" and "Summaries" were alphabetized, as were also the most important subtopics listed under the units and major topics. Table XV shows the units or major topics and the most important subtopics, together with the indexes of significance found for each at the ninth grade level. These indexes of significance were computed in

⁴ See description of method used for outlining, Chapter⁵II, pages 33ff.

accordance with the technique described on pages 47 ff. of Chapter II. Similar tables, not included in this publication, were prepared for each of the other eight grades.

An attempt was next made to compare the findings in the various unit-topic charts by summarizing them on a master unit-topic chart. Because of the many variations that makers of courses of study used in treating or emphasizing different phases of science, all major topics and subtopics were combined into a single list of general topics, which is here called a master unit-topic chart. (Table XVI, page 70.)

In constructing the master unit-topic chart it was found necessary to take into consideration the fact that some items appeared as unit topics or major topics in one course of study and as subtopics in other courses. In such instances the item was placed as a unit topic in the master unit-topic chart. For example, in one course "Acid" appears as a unit topic, or major topic, but in another "Acids" appears as a subtopic under "Acids, Bases, and Salts." Hence "Acid" was listed as a subtopic under the major topic, "Acids, Bases, and Salts."

The indexes of significance for the topics in each of the various grades listed in the master chart were obtained in the following manner. In the ninth grade unit-topic chart (Table XV) "Agriculture" appeared as a subtopic under "Living Things" and also as a unit. The index of significance for this topic on the master unit-topic chart (8:243/22) was found by combining all the indexes of significance for "Agriculture," whether it appeared as a unit heading, a topic heading, or a subtopic. This index of significance was derived from the indexes of significance of "Agriculture" as a unit (3:165/22) and "Agriculture" as a subtopic under "Living Things" (5:78/22). (See Table XVI.) Another example will make clear how these combinations were made in order to secure the indexes of significance which were placed on the master unit-topic chart. "Water" appears as a major topic for the ninth grade in Table XVI, with an index of significance of 16:498/22. This index of significance was the result of combining the indexes of significance of "Water" as a unit (13:425/22); "Water" under "Chemistry of Matter" (1:12/22); "Water" under "Agriculture" 1:15/22; and "Water" under "Transportation" (5:46/22) (Table XV). The indexes of significance for all the topics in each grade in the master unit-topic chart for each of the examples given were obtained in the same manner from the unit-topic charts.

In making up these composite indexes of significance, the numbers

TABLE XV

Indexes of Significance of Units or Major Topics Found in Ninth Grade General Science Courses

Unit or Major Topic	Index of Significance	Unit or Major Topic	Index of Significance
INTRODUCTION.....	10:448/22	Invertebrates	1:12/22
Energy.....	6:78/22	Vertebrates	1:93/22
Environment.....	4:57/22		
Experimentation.....	5:91/22	ASTRONOMY.....	11:422/22
Matter.....	5:112/22	Comets and Meteors....	1:6/22
Measurement.....	4:35/22	Earth and Its Motions .	7:52/22
Scientific Age.....	2:25/22	Historical	5:33/22
Work.....	4:63/22	Instruments.....	4:37/22
AGRICULTURE.....	3:165/22	Life	1:11/22
Animal Husbandry ..	1:7/22	Moon	2:21/22
Crops	1:21/22	Planets	4:20/22
Eggs.....	1:9/22	Solar System	9:158/22
Foods and Plants.....	2:33/22	Stars and Constellations.	10:74/22
Fruits	1:16/22	Sun	3:28/22
Milk.....	1:10/22	Universe	1:11/22
Problems	1:6/22		
Soil	2:56/22	CHEMISTRY OF MATTER	6:628/22
Water	1:15/22	Acids, Bases, Salts	4:132/22
AIR.....	11:716/22	Atoms and Molecules .	1:14/22
Action of.....	4:21/22	Cleaning	1:32/22
Atmosphere.....	2:9/22	Concrete	1:8/22
Composition.....	5:47/22	Elements, Compounds	
Elements, Compounds		and Mixtures. . . .	3:29/22
and Mixtures. . . .	1:6/22	Fertilizer.. . . .	1:34/22
Fire.....	1:7/22	Fire.....	1:33/22
Health.....	4:48/22	First Aid.....	1:28/22
Historical	2:10/22	Inks.....	1:15/22
Life.....	8:115/22	Insecticides	1:9/22
Matter.....	4:36/22	Kinds of Substances .	1:19/22
Oxygen and Oxidation..	6:89/22	Metals	2:124/22
Pressure.....	6:65/22	Matter, Nature of ..	2:17/22
Sound.....	6:125/22	Photography	1:10/22
Uses.....	8:142/22	Physical and Chemical	
Ventilation.....	1:35/22	Changes	1:5/22
Weather	1:5/22	Soap	1:10/22
ANIMALS.....	1:201/22	Soil	1:11/22
Insects.....	1:98/22	Textiles	1:33/22
		Uses.....	1:78/22
		Water	1:12/22

TABLE XV (*Continued*)

Unit or Major Topic	Index of Significance	Unit or Major Topic	Index of Significance
CLOTHING.....	2:64/22	Expanding Gases	1:12/22
Care.	1:2/22	Gravitation.	1:10/22
Cleaning	2:28/22	Inertia.. . . .	1:7/22
Dyeing	1:10/22	Kinds of Energy	1:9/22
Homes.	1:6/22	Measurements.	1:30/22
Materials	1:2/22	Molecular Forces	1:10/22
Purpose of	1:8/22	ENERGY IN INDUSTRY . . .	5:578/22
Selection	1:2/22	Automobile	1:95/22
Textiles	2:14/22	Communication.	1:5/22
COMMUNICATION.....	4:111/22	Electricity	3:51/22
Electrical System.....	2:11/22	Energy	3:30/22
Methods.	3:40/22	Heat.	3:51/22
Radio	2:11/22	Magnetism	1:11/22
Sound	2:18/22	Metals	2:41/22
Social Effects.. . . .	1:3/22	Power and Power	
Telegraph	1:3/22	Devices	3:82/22
Telephone.....	2:5/22	Simple Machines	1:73/22
Voice and Ear	1:7/22	Social Effects	1:11/22
CONSERVATION.	1:39/22	Sources and Kinds of . .	3:68/22
Animal and Plant Life	1:14/22	Transportation	1:19/22
Forests	1:9/22	FIRE	1:5/22
Fuels.	1:2/22	Chemical Change	1:3/22
Soil.	1:17/22	Control	1:2/22
CONSTRUCTION OF HOUSES	1:43/22	Energy Change	1:2/22
Materials	1:43/22	FOOD	12.782/22
EARTH SCIENCE	6:172/22	Adulteration	4:25/22
Deposition	1:2/22	Assimilation of	1:72/22
Diastrophism	3:23/22	Clothing and Shelter . .	1:8/22
Erosion	3:39/22	Composition	1:28/22
Minerals.....	4:15/22	Diets	5:78/22
Oceans...	1:7/22	Health.. . . .	2:18/22
Origin of Earth. . . .	4:21/22	Historical	1:4/22
Rocks	4:30/22	Milk	2:24/22
Rocks, Artificial . . .	2:17/22	Narcotics and	
Soil	4:22/22	Stimulants.	2:27/22
Volcanism.....	2:9/22	Preparation	5:44/22
Weathering	1:9/22	Preservation and	
ENERGY AND FORCE. . . .	1:78/22	Care of	7:106/22
Centrifugal Force . . .	1:6/22	Production and Sources	6:66/22
		Selection	4:24/22

TABLE XV (Continued)

Unit or Major Topic	Index of Significance	Unit or Major Topic	Index of Significance
FOOD (Cont.)		Digestion.....	2:16/22
Transportation.....	1:81/22	Diseases.....	3:26/22
Types.....	6:81/22	Energy.....	1:2/22
Uses in Body.....	7:146/22	First Aid.....	2:15/22
		Food.....	2:16/22
FUELS	1:40/22	Health.....	2:7/22
Conservation.....	1:7/22	Improvement.....	1:15/22
History of.....	1:4/22	Nervous System.....	3:51/22
Kinds and Sources.....	1:30/22	Nostrums.....	1:8/22
		Respiration.....	2:11/22
HEALTH	3:188/22	Structure and Function .	2:14/22
Blood.....	1:14/22	Waste Products.....	1:2/22
Clothing.....	1:5/22		
Digestion.....	1:24/22	LIGHT	18:947/22
Disease.....	3:22/22	Artificial.....	15:326/22
First Aid.....	2:87/22	Behavior of.....	10:103/22
Foods.....	2:10/22	Color.....	4:22/22
Historical.....	1:7/22	Eye.....	14:193/22
Hygiene.....	2:11/22	Heat.....	1:7/22
Nervous System.....	1:2/22	Illumination.....	3:27/22
Respiration.....	1:9/22	Natural Light.....	10:161/22
Sanitation.....	1:4/22	Optical Properties.....	4:28/22
Skeleton.....	1:5/22	Photography.....	4:37/22
Skin.....	1:2/22	Reflection and	
		Refraction.....	2:69/22
HEAT	12:641/22	Sources.....	1:4/22
Conservation.....	1:2/22	Television.....	1:6/22
Effect on Matter.....	11:80/22	Uses of.....	2:11/22
Electricity.....	1:11/22		
Fire.....	6:80/22	LIVING THINGS	15:881/22
Fuels.....	9:93/22	Adaptation.....	2:25/22
Heating Devices.....	7:172/22	Agriculture.....	5:78/22
Measurement.....	5:57/22	Animals.....	4:36/22
Nature of.....	1:5/22	Balance of Nature.....	2:19/22
Safety.....	1:2/22	Cells and Protoplasm...	4:34/22
Sources.....	7:63/22	Classification.....	1:2/22
Theory.....	1:4/22	Conservation.....	3:56/22
Transference.....	7:89/22	Diseases.....	1:8/22
Uses.....	3:31/22	Energy.....	4:74/22
Ventilation.....	1:7/22	Eugenics.....	3:28/22
		Genetics.....	1:13/22
THE HUMAN BODY	6:175/22	Growth Factors.....	3:42/22
Blood.....	2:10/22	Heredity.....	1:4/22

TABLE XV (Continued)

Unit or Major Topic	Index of Significance	Unit or Major Topic	Index of Significance
LIVING THINGS (Cont.)		Social Effects.....	1:2/22
Insects	5:40/22	Static Electricity	5:49/22
Interdependence	5:68/22	Transformers.....	1:2/22
Life Functions.....	5:83/22	Uses.....	9:78/22
Man's Use of.....	4:32/22	Man's Dependence and Adaptation to His Environment....	1:165/22
Microorganisms.....	3:29/22	Climate, Adaptation to .	1:51/22
Origin of Life.....	1:2/22	Clothing.....	1:8/22
Plants.....	7:124/22	Food	1:23/22
Reproduction... ..	2:35/22	Natural Resources, Conservation of. . .	1:29/22
Soil	4:88/22	Needs ...	1:12/22
Variety.....	2:18/22	Plants and Animals, Allies and Enemies... .	1:38/22
MACHINES		Shelter.. ..	1:9/22
Air and Water Forces... .	2:31/22	MICROORGANISMS	
Automobile.....	1:95/22	Bacteria, Yeast, Molds	8:528/22
Electricity.....	1:8/22	Beneficial Microorgan- isms	6:129/22
Energy.....	5:37/22	Control of.....	4:42/22
Engines.....	5:24/22	Disease	6:231/22
Friction	2:16/22	Germ Theory of Disease	4:22/22
Historical.....	1:10/22	Health.....	4:31/22
Matter	1:5/22	Historical.....	2:6/22
Power	3:13/22	Microscope.....	1:18/22
Simple Machines.....	11:228/22	RADIO.....	
Uses.....	1:16/22	Broadcasting and Receiving	1:50/22
Work.....	7:53/22	Crystal Set.....	1:13/22
Social Effects.....	2:8/22	History	1:6/22
MAGNETISM AND		Vacuum Tube Set... .	1:18/22
ELECTRICITY	12:1001/22	SCIENCE IN EVERYDAY LIFE	
Appliances.....	2:4/22	Common Appliances....	1:78/22
Cells and Batteries.....	6:49/22	Community Life.....	1:11/22
Chemical Effects.....	2:54/22	Dining Room... .	1:12/22
Circuits.....	7:45/22	Exterior of House	1:7/22
Current Electricity.....	6:38/22	Health.....	1:5/22
Dynamos.....	3:10/22	Kitchen	1:19/22
Electromagnetism	4:161/22	Living Room.....	1:17/22
Heating Effects... ..	4:44/22		1:11/22
Magnetism	11:140/22		
Measuring	8:57/22		
Motor	3:12/22		
Production	7:45/22		
Radio	1:18/22		
Safety.....	2:8/22		

TABLE XV (Continued)

Unit or Major Topic	Index of Significance	Unit or Major Topic	Index of Significance
SOUND.....	6:283/22	Pressure.....	4:28/22
Characteristics	3:26/22	Purification of	
Echoes.....	1:8/22	Water Supply.....	8:63/22
Man, Effect on.....	1:2/22	Refrigeration.....	1:6/22
Music.....	5:97/22	Sewage.....	3:14/22
Nature of	1:10/22	Solvent, as a	1:22/22
Production	3:17/22	Sources	10:76/22
Transmission.....	4:61/22	Uses	8:69/22
Voice and Ear....	4:47/22	Water Cycle	4:16/22
TRANSPORTATION.....	5:153/22	Weather.	1:10/22
Air.....	4:32/22	WEATHER AND CLIMATE...	6:279/22
Communication	1:8/22	Air Movements.....	4:37/22
Land	5:36/22	Effects of.....	4:16/22
Methods.....	1:8/22	Factors	5:151/22
Modern Life, Effect on .	3:13/22	Forecasting.....	5:44/22
Uses	1:9/22	Precipitation.....	3:37/22
Water.	5:46/22	Superstitions.....	1:2/22
WATER.....	13:425/22	GENERAL SUMMARY	1:25/22
Characteristics	7:88/22	Citizenship	1:6/22
Conservation.....	3:11/22	Health.....	1:5/22
Devices.....	2:17/22	Leisure.....	1:6/22
Distribution.....	4:35/22	Vocation.....	1:11/22

at the left of the colon in the separate indexes of significance were obtained by actually counting the number of courses in which the respective units, major topics, or subtopics appeared. For "Water" this number is 16. If the actual numbers to the left of the colon in each of the indexes of significance had been added, this number would have been 20. The total, 20, however, would have involved duplication, because some courses contained a unit, "Water," and also "Water" as a subtopic. Sixteen, therefore, represents the different courses of study which contain "Water" as a unit (or major topic), or subtopic, or both. The numbers at the right of the colon represent the total number of items included in the various contributing indexes and are a gross total. The denominator of the artificial fraction represents the total number of courses analyzed in any one grade or group of grades, and remains the same, of course, for each index in the grade or group of grades.

The numbers representing courses of study in which the various topics, unit headings, and subtopics were found (numbers at the left of the colon) do not involve duplication in counting. The same is true for the total number of courses of study analyzed (the number in the denominator). The numbers representing the total number of items, however, do imply duplication in some cases. For example, "Water" as a major topic or unit heading has a total of 498 items. Of this total, fifteen items occurred *under* the unit heading, or major topic, "Agriculture." These same fifteen items were also counted as part of the total number of items *in* the unit heading "Agriculture." That is to say, the topic "Water" under "Agriculture" was counted twice (in separate places), once under "Agriculture" and once under "Water."

As another example, the index of significance for "Fire" for the ninth grade, as given in the master unit-topic chart is 8:125/22. Of the 125 items, five were obtained from the unit heading "Fire"; seven were obtained from the subtopic "Fire" found under "Air"; thirty-three were obtained from the subtopic "Fire" found under "Chemistry of Matter"; eighty were obtained from the subtopic "Fire" found under "Heat." These were added to obtain the total number of items in the index of significance for the major topic "Fire," which is 125. These same items, with the exception of the five items obtained from the major topic "Fire," were counted also with the various major topics under which they occurred. That is, the count

TABLE XVI

Indexes of Significance of Major Topics Found in Science Courses

Major Topic	4	GRADE 5	6	Intermediate Total	7	GRADE 8
Acceleration						
Acids, Bases, Salts						
Acids, Organic						
Adaptation and Control		2:93/15		2:93/41	3:22/18	4:78/22
Aeronautics					1:6/18	4:32/22
Agriculture		1:8/15		1:8/41	1:7/18	1:29/22
Air (Atmosphere)					11:636/18	8:173/22
Air Conditioning						1:8/22
Air, Liquid						
Air Movements (Winds)	2:13/14			2:13/41	4:74/18	4:31/22
Alcohols						
Aldehydes						
Alkaloids						
Allotropic Forms						
Alloys						
Aluminum						
Ammonia						
Amphibians		2:17/15		2:17/41	1:10/18	3:15/22
Analysis (Chemical Inorganic)						
Animal Kingdom						
Animals	8:145/14	2:23/15	1:7/12	11:175/41	5:282/18	6:203/22
Appliances (Electrical)						2:19/22
Aquaria		1:9/15		1:9/41		
Astronomy					4:246/18	18:1081/22
Atomic Theory						1:2/22
Automobile						
Avogadro's Law						
Bacteria					2:38/18	1:13/22
Bacteria and Fungi (<i>see</i> <i>also</i> Fungi)	3:24/14	3:14/15	1:3/12	7:41/41		
Baking Powders						
Birds	2:62/14	6:81/15	2:10/12	10:153/41	2:44/18	7:294/22
Bodies of Water						6:51/22
Boron						
Boyle's Law						
Brain Centers						
Building Materials					2:7/18	
Buoyancy						2:14/22
Calcium						
Calories						
Capillary Action						

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
				2: 7/8	2: 7/29	2: 7/132
1: 132/22	1: 132/62		8: 453/12		8: 453/29	9: 585/132
			6: 88/12		6: 88/29	6: 88/132
3: 76/22	10: 176/62	7: 293/9			7: 293/29	19: 562/132
4: 32/22	9: 70/62					9: 70/132
8: 243/22	10: 279/62	1: 63/9			1: 63/29	12: 350/132
11: 716/22	30: 1525/62		7: 327/12		7: 327/29	37: 1852/132
	1: 8/62					1: 8/132
			4: 28/12		4: 28/29	4: 28/132
4: 37/22	12: 142/62		1: 8/12	1: 3/8	2: 11/29	16: 166/132
			6: 134/12		6: 134/29	6: 134/132
			3: 39/12		3: 39/29	3: 39/132
			2: 16/12		2: 16/29	2: 16/132
			7: 153/12		7: 153/29	7: 153/132
			4: 48/12		4: 48/29	4: 48/132
			3: 41/12		3: 41/29	3: 41/132
			3: 41/12		3: 41/29	3: 41/132
	4: 25/62					6: 42/132
			2: 187/12		2: 187/29	2: 187/132
		5: 803/9			5: 803/29	5: 803/132
3: 114/22	14: 599/62	1: 6/9			1: 6/29	26: 780/132
3: 15/22	5: 34/62					5: 34/132
						1: 9/132
11: 422/22	33: 1749/62		1: 8/12	1: 3/8	2: 11/29	35: 1760/132
1: 14/22	2: 16/62		7: 85/12		7: 85/29	9: 101/132
1: 95/22	1: 95/62					1: 95/132
			2: 6/12		2: 6/29	2: 6/132
6: 129/22	9: 180/62	2: 150/9			2: 150/29	11: 330/132
						7: 41/132
			1: 4/12		1: 4/29	1: 4/132
	9: 338/62	1: 79/9			1: 79/29	20: 570/132
	6: 51/62					6: 51/132
			1: 19/12		1: 19/29	1: 19/132
			4: 29/12		4: 29/29	4: 29/132
		1: 2/9			1: 2/29	1: 2/132
1: 43/22	3: 50/62		1: 3/12		1: 3/29	4: 53/132
	2: 14/62			3: 16/8	3: 16/29	5: 30/132
			6: 242/12		6: 242/29	6: 242/132
		1: 8/9			1: 8/29	1: 8/132
				3: 14/8	3: 14/29	3: 14/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Intermediate Total	7	GRADE 8
Carbohydrates.						
Carbon and Its Compounds.						
Carbon-Silicon Family. .						
Catalysis.						
Cathode Rays						
Cells and Batteries . . .						2:13/22
Cells and Protoplasm. . .					1:5/18	1:3/22
Centrifugal and Centripetal Forces . . .						
Change of State.					1:10/18	
Changes (Chemical and Physical)			1:10/12	1:10/41	2:20/18	1:9/22
Charles's Law						
Chemical Arithmetic . .						
Chemical Effect (Electricity).						2:16/22
Chemistry.						1:3/22
Chromosomes.						
Chromium						
Circuits (Electrical) . .					1:3/18	5:29/22
Circulation (Blood) . .					2:70/18	2:40/22
Cleaning.					3:21/18	1:42/22
Climate.					3:36/18	4:20/22
Clothing					3:146/18	1:7/22
Coal Tar						
Cohesion and Adhesion .						
Color.						1:8/22
Colloids						
Comets						2:13/22
Communication					1:3/18	7:112/22
Conservation.	2:8/14		2:10/12	4:18/41	1:2/18	5:48/22
Conservation of Energy, Law of.						
Conservation of Matter, Law of.						
Compressed Gases.						2:85/22
Cooking						3:16/22
Copper.						
Cosmic Rays.						
Crystallization.						
Cultural Development.						

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
			6:214/12		6:214/29	6:214/132
			10:1367/12		10:1367/29	10:1367/132
			5:201/12		5:201/29	5:201/132
			3:22/12		3:22/29	3:22/132
				4:21/8	4:21/29	4:21/132
6:49/22	8:62/62			6:53/8	6:53/29	14:115/132
4:34/22	6:42/62	8:73/9			8:73/29	14:115/132
1:6/22	1:6/62			2:9/8	2:9/29	3:15/132
	1:10/62		6:63/12	8:103/8	14:166/29	15:176/132
2:8/22	5:37/62		11:241/12	1:5/8	12:296/29	18:343/132
			4:29/12		4:29/29	4:29/132
			7:69/12		7:69/29	7:69/132
3:51/22	5:67/62					5:67/132
	1:3/62					1:3/132
		1:2/9			1:2/29	1:2/132
			1:85/12		1:85/29	1:85/132
7:45/22	13:77/62					13:77/132
3:24/22	7:134/62	4:119/9				11:253/132
3:60/22	7:123/62		1:3/12		1:3/29	8:126/132
1:51/22	8:107/62					8:107/132
5:85/22	9:238/62	1:3/9			1:3/29	10:241/132
			1:3/12		1:3/29	1:3/132
				3:15/8	3:15/29	3:15/132
4:22/22	5:30/62			6:70/8	6:70/29	11:100/132
			2:75/12		2:75/29	2:75/132
	2:13/62					2:13/132
6:124/22	14:239/62		1:29/12		1:29/29	15:268/132
7:115/22	13:165/62	3:216/9		2:12/8	5:238/29	22:421/132
			1:6/12		1:6/29	1:6/132
			2:9/12		2:9/29	2:9/132
	2:85/62					2:85/132
5:44/22	8:60/62					8:60/132
			4:109/12		4:109/29	4:109/132
				1:3/8	1:3/29	1:3/132
			1:12/12		1:12/29	1:12/132
		1:124/9			1:124/29	1:124/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Intermediate Total	7	GRADE 8
Definite Composition,						
Law of.....					2:9/18	
Deserts.....						1:7/22
Diastrophism.....						
Diet.....					2:29/18	2:22/22
Diffusion.....						
Digestion and						
Assimilation.....		2:11/15		2:11/41		3:74/22
Disease (<i>see</i>						
Microorganisms)		1:9/15		1:9/41	4:32/18	7:83/22
Ductless Glands.....						1:5/22
Dyes					2:9/18	
Dynamos.....					3:23/18	
Earth Measurements .	1:4/14	1:9/15	1:36/12	3:49/41		4:36/22
Earth Motions.....					3:46/18	11:188/22
Earth, Origin of					3:15/18	2:12/22
Earth Science.....	8:90/14	6:257/15	6:51/12	20:398/41	11:665/18	7:396/22
Earth Surface,						
Changes in... ..					2:14/18	4:26/22
Earthworms.....						2:18/22
Eclipses.....					1:3/18	6:25/22
Elasticity.....						
Electricity (Current) ...			1:8/12	1:8/41		4:73/22
Electricity (Static).....					3:3/18	2:17/22
Electric Radiation and						
Radio Activity.....						
Electrochemical Series...						
Electrolysis						
Electromagnetism					1:4/18	2 38/22
Electron Theory						
Elements, Compounds,						
Mixtures... ..						3:13/22
Embryology.....						
Energy.....		2:30/15	3:27/12	5:57/41	1:20/18	6:86/22
Energy and Chemical						
Change.....						
Energy and Force.....						
Energy in Industry.....						
Energy, Use and						
Control.....						8:411/22
Engines.....						9:97/22
Environment.....	4:30/14	1:6/15	1:4/12	6:40/41	3:41/18	4:40/22

TABLE XVI (*Continued*)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
	2:9/62		5:11/12	2:7/8	7:18/29	9:27/132
	1:7/62	1:16/9			1:16/29	2:23/132
3:23/22	3:23/62					3:23/132
5:78/22	8:129/62	2:51/9	1:11/12		3:62/29	12:191/132
				3:11/8	3:11/29	3:11/132
4:112/22	7:186/62	4:147/9			4:147/29	13:344/132
11:109/22	22:224/62	4:486/9			4:486/29	27:719/132
	1:5/62	2:40/9			2:40/29	3:45/132
1:10/22	3:19/62		2:11/12		2:11/29	5:30/132
3:10/22	6:33/62			6:73/8	6:73/29	12:106/132
	4:36/62					7:85/132
7:52/22	21:286/62					21:286/132
4:21/22	9:48/62					9:48/132
6:172/22	24:1231/62					44:1629/132
	6:40/62					6:40/132
	2:18/62					2:18/132
	7:28/62					7:28/132
				4:27/8	4:27/29	4:27/132
4:62/22	8:135/62			4:74/8	4:74/29	13:217/132
5:49/22	10:69/62			7:86/8	7:86/29	17:155/132
				7:170/8	7:170/29	7:170/132
			2:5/12		2:5/29	2:5/132
			1:3/12		1:3/29	1:3/132
4:161/22	7:203/62			6:57/8	6:57/29	13:260/132
			4:66/12	1:4/8	5:70/29	5:70/132
1:7/22	4:20/62		2:22/12		2:22/29	6:42/132
		2:42/9			2:42/29	2:42/132
11:222/22	18:328/62	1:10/9	3:29/12	3:23/8	7:62/29	30:447/132
1:9/22	1:9/62		1:85/12		1:85/29	2:94/132
1:78/22	1:78/62					1:78/132
5:578/22	5:578/62					5:578/132
	8:411/62					8:411/132
5:24/22	14:121/62					14:121/132
4:57/22	11:138/62	6:84/9	1:7/12		7:91/29	24:269/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Inter. Total	7	GRADE 8
Equations (Chemical)...						
Equilibrium (Chemical)...						
Erosion.....					4: 67/18	2: 10/22
Essential Activities and Needs.....						4: 19/22
Esters.....						
Ethers.....						
Eugenics.....					1: 7/18	
Evaporation and Condensation.....					1: 3/18	1: 7/22
Everyday Life, Science in					2: 60/18	4: 63/22
Evolution and Heredity.....						1: 126/22
Expansion and Contraction.....					1: 5/18	
Excretion.....					2: 70/18	1: 3/22
Exploring with Rod, Gun, Camera.....						2: 5/22
Eye.....						
Falling Bodies.....						
Fats and Oils.....						
Fertilizers..						
Fire.....		1: 109/15	1: 8/12	2: 117/41	10: 529/18	6: 197/22
Fire Prevention and Loss						1: 10/22
Fish.....	1: 12/14	3: 51/15		4: 63/41	1: 42/18	4: 63/22
Flowers.....					3: 53/18	2: 81/22
Food ..			1: 9/12	1: 9/41	8: 277/18	15: 387/22
Food Cycle.....						1: 3/22
Food, Diet, Nutrition ..						
Food Making.....						
Food Value.....						
Forces, Addition of....						
Force and Motion.....						4: 40/22
Forest.....						
Formulas.....						
Formulas and Equations						
Fossils.....		1: 15/15		1: 15/41	2: 8/18	
Friction.....						2: 10/22
Fruit.....		1: 10/15		1: 10/41	1: 7/18	1: 9/22
Fuel.....					6: 38/18	3: 40/22
Functions.....						
Fungi.....					1: 10/18	3: 17/22

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
			7:67/12		7:67/29	7:67/132
			2:28/12		2:28/29	2:28/132
3:39/22	9:116/62					9:116/132
	4:19/62					4:19/132
			4:44/12		4:44/29	4:44/132
			3:30/12		3:30/29	3:30/132
3:28/22	4:35/62	5:43/9			5:43/29	9:78/132
	2:10/62		2:7/12		2:7/29	4:17/132
1:78/22	7:201/62		4:325/12		4:325/29	11:526/132
	1:126/62	8:691/9			8:691/29	9:817/132
	1:5/62			6:55/8	6:55/29	7:60/132
1:2/22	4:75/62	3:62/9			3:62/29	7:137/132
		2:491/9			2:491/29	2:491/132
14:193/22	16:198/62			3:31/8	3:31/29	19:229/132
				2:8/8	2:8/29	2:8/132
			3:39/12		3:39/29	3:39/132
1:34/22	1:34/62		2:15/12		2:15/29	3:49/132
8:125/22	24:851/62					26:968/132
	1:10/62					1:10/132
	5:105/62					9:168/132
	5:134/62	2:172/9			2:172/29	7:306/132
15:864/22	38:1528/62	4:283/9	6:93/12		10:376/29	49:1913/132
	1:3/62	1:10/9			1:10/29	2:13/132
		2:182/9			2:182/29	2:182/132
		3:40/9			3:40/29	3:40/132
		1:7/9			1:7/29	1:7/132
				2:15/8	2:15/29	2:15/132
	4:40/62			8:182/8	8:182/29	12:222/132
1:9/22	1:9/62					1:9/132
			9:62/12		9:62/29	9:62/132
			9:278/12		9:278/29	9:278/132
	2:8/62	1:3/9			1:3/29	4:26/132
2:16/22	4:26/62			4:17/8	4:17/29	8:43/132
	2:16/62					3:26/132
10:135/22	19:213/62		3:54/12		3:54/29	22:267/132
		1:6/9			1:6/29	1:6/132
	4:27/62					4:27/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Inter. Total	7	GRADE 8
Garden.....	3:40/14	4:92/15	2:10/12	9:142/41	4:17/18	5:279/22
Gases.....			1:6/12	1:6/41		
Gas Laws.....						
Gay-Lussac's Law.....						
General Summary.....					1:3/18	
Genetics.....						
Glaciers.....					1:2/18	1:3/22
Glass.....						
Graham's Law.....						
Grasses.....					1:7/18	
Gravitation.....		1:4/15		1:4/41		5:26/22
Growth Factors.....					4:60/18	
Habitats.....		1:7/15		1:7/41		
Halogens.....						
Health.....					11:417/18	12:341/22
Health Services.....					1:5/18	1:3/22
Heat.....					3:57/18	7:306/22
Heating and Ventilating.....					6:121/18	3:25/22
Heating Effect (Electricity).....					2:14/18	2:14/22
Helium.....					1:3/18	
Heredity, Laws of.....						
Hermaphroditism.....						
Historical Materials.....			1:4/12	1:4/41	11:64/18	9:89/22
Home.....			1:1/12	1:1/41		
Home, Science in.....					1:9/18	
Human Body.....					4:453/18	3:111/22
Humidity.....					1:27/18	
Hydrocarbons.....						
Hydrogen.....						
Hydrogen Peroxide.....						
Hygiene.....		1:79/15		1:79/41	1:6/18	3:28/22
Hydrolysis.....						
Illumination.....						2:14/22
Impedance (Electrical).....						
Improvement of Life.....						
Indicators.....						
Induced Currents.....						1:3/22
Industry.....						1:29/22
Industrial Chemistry.....						
Inertia.....						1:4/22
Insects.....	6:104/14	6:99/15	1:8/12	13:211/41	3:55/18	6:287/22

Courses in Science

79

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
	9: 296/62	1: 40/9			1: 40/29	19: 478/132
1: 12/22	1: 12/62		2: 19/12 11: 201/12 3: 11/12	4: 69/8	6: 88/29 11: 201/29 3: 11/29	8: 106/132 11: 201/132 3: 11/132
1: 25/22	2: 28/62					2: 28/132
1: 13/22	1: 13/62					1: 13/132
	2: 5/62					2: 5/132
			1: 5/12 1: 2/12		1: 5/29 1: 2/29	1: 5/132 1: 2/132
	1: 7/62					1: 7/132
1: 10/22	6: 36/62			2: 7/8	2: 7/29	9: 47/132
3: 42/22	7: 102/62	1: 2/9 1: 189/9			1: 2/29 1: 189/29	8: 104/132 2: 196/132
			8: 410/12		8: 410/29	8: 410/132
6: 242/22	29: 1050/62	6: 423/9	4: 141/12		10: 564/29	39: 1614/132
	2: 8/62	1: 6/9			1: 6/29	3: 14/132
13: 699/22	23: 1062/62		3: 30/12	8: 433/8	11: 463/29	34: 1525/132
9: 214/22	18: 360/62		1: 3/12		1: 3/29	19: 363/132
4: 44/22	8: 72/62			5: 45/8	5: 45/29	13: 117/132
	1: 3/62					1: 3/132
5: 45/22	5: 45/62	8: 109/9 1: 2/9		8: 109/8		13: 154/132
					1: 2/29	1: 2/132
7: 104/22	27: 257/62	5: 81/9	6: 88/12	1: 48/8	12: 217/29	40: 478/132
1: 6/22	1: 6/62					2: 7/132
	1: 9/62		3: 32/12		3: 32/29	4: 41/132
6: 175/22	13: 739/62	4: 848/9			4: 848/29	17: 1587/132
	1: 27/62					1: 27/132
			5: 260/12 3: 138/12 2: 8/12		5: 260/29 3: 138/29 2: 8/29	5: 260/132 3: 138/132 2: 8/132
2: 11/22	6: 45/62		3: 14/12		3: 14/29	7: 124/132
						3: 14/132
3: 27/22	5: 46/62			4: 43/8 1: 7/8	4: 43/29 1: 7/29	9: 89/132 1: 7/132
		4: 32/9			4: 32/29	4: 32/132
			1: 6/12		1: 6/29	1: 6/132
	1: 3/62			4: 33/8	4: 33/29	5: 36/132
	1: 29/62					1: 29/132
			6: 218/12		6: 218/29	6: 218/132
1: 7/22	2: 11/62					2: 11/132
6: 138/22	15: 480/62	2: 146/9			2: 146/29	30: 837/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Inter. Total	7	GRADE 8
Insects, Control of.....						
Instinct.....						
Instruments						
(Astronomical).....					1:13/18	4:14/22
Instruments (Optical)...						1:4/22
Insulation.....						1:2/22
Intelligence						
Interdependence					2:4/18	4:87/22
Introduction.....					6:117/18	3:27/22
Invertebrates.	1:5/14	1.7/15	1:6/12	3:18/41		
Ionization.....						
Iron.....						
Irrigation.....					1:4/18	1:2/22
Isotopes.....						
Inks.....						
Kinetic Molecular Theory.....						
Land.....						2:43/22
Laws and Theories of Chemical Change.....						
Lead.....						
Leisure.....						1:12/22
Lenses.....						
Life.....					4:29/18	3:36/22
Life Activities.....						1:17/22
Life Cycles.....					1:17/18	
Light.....					2:27/18	7:104/22
Light and Heat.....	2:65/14	3:48/15	2:5/12	7:118/41		
Lime.....						
Living Things.....	1:115/14			1:115/41	14:676/18	13:1482/22
Living Things, Behavior of.....						1:13/22
Living Things, Classification						1:18/22
Living Things, Economic Importance.	3:39/14	3:80/15		6:119/41	1:21/18	1:24/22
Living Things, Environment.....						
Living Things, Man's Control of.....						
Living Things, Structure and Function.....					5:217/18	4:56/22

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
1:9/22	1:9/62	2:12/9			2:12/29	3:21/132
1:16/22	1:16/62					1:16/132
4:37/22	9:64/62					9:64/132
	1:4/62			5:57/8	5:57/29	6:61/132
	1:2/62			1:7/8	1:7/29	2:9/132
		1:6/9			1:6/29	1:6/132
5:68/22	11:159/62	6:86/9			6:86/29	17:245/132
10:448/22	19:592/62	7:169/9			7:169/29	26:761/132
1:12/22	1:12/62	2:51/9			2:51/29	6:51/132
			10:165/12		10:165/29	10:165/132
			6:625/12		6:625/29	6:625/132
	2:6/62					2:6/132
		1:3/9			1:3/29	1:3/132
1.15/22	1:15/62					1:15/132
			6:65/12	6:39/8	12.104/29	12:104/132
	2:43/62					2:43/132
			5:331/12		5:331/29	5:331/132
			3:191/12		3:191/29	3:191/132
1:6/22	2.18/62	2:9/9	1:47/12		3:56/29	5:74/132
				3:28/8	3:28/29	3:28/132
9:140/22	16:205/62	2:283/9	3.12/12		5:295/29	21:500/132
5:83/22	6:100/62	4:271/9			4:271/29	10:371/132
	1:17/62	3:17/9			3:17/29	4:34/132
18:947/22	27:1078/62			7:381/8	7:381/29	34:1459/132
			1:10/12		1:10/29	1:10/132
15:881/22	42:3039/62	1:66/9	2:12/12		3:78/29	46:3232/132
	1:13/62	4:101/9			4:101/29	5:114/132
	1:18/62	4:512/9			4:512/29	5:530/132
	2:45/62	4:80/9			4:80/29	12:244/132
		5:450/9			5:450/29	5:450/132
		3:51/9			3:51/29	3:51/132
1:14/22	10:287/62	1:2/9			1:2/29	11:289/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Inter Total	7	GRADE 8
Liquids.....	1:4/14			1:4/41		
Machines ..	1:11/14	3:39/15	1:7/12	5:57/41	1:3/18	10:243/22
Magnesium.....						
Magnetism.....					2:10/18	
Magnetism and						
Electricity ..	8 109/14	3:102/15	2:20/12	13:231/41	2:30/18	3:371/22
Making a Living.....						
Manganese.....						
Mammals ..	2:24/14	3:34/15	2 9/12	7:67/41	1:38/18	3:39/22
Man and His						
Environment.....						
Mass ..						1:3/22
Matches ..					2:6/18	1:4/22
Matter ..	1:17/14			1 17/41		5:60/22
Matter and Energy ..						4:80/22
Matter, Nature and						
Composition ..						
Matter, States of ..					1:10/18	
Measurement ..					1 4/18	4:28/22
Mechanics ..						
Mechanics of Solids and						
Fluids ..						
Medicine.....						
Mental Health ..					2 35/18	1:7/22
Mercury ..						
Metabolism ..						
Metallurgy ..						
Metals ..					1 3/18	2:10/22
Meteors and Meteorites.....						4:14/22
Metric System ..						1:2/22
Microorganisms and						
Disease (<i>see</i> Disease).....					1:58/18	4:63/22
Microscope ..						
Migration ..						1:42/22
Minerals.....						3:70/22
Minerals, Food ..					1:3/18	
Molds.....						
Molecular Forces ..						
Molecular Weight ..						
Momentum ..						
Moon ..		2:18/15	1:9/12	3:27/41	2:32/18	8:66/22
Mosses ..					1:6/18	

Courses in Science

83

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
13:692/22	24:938/62			4:97/8 5:122/8	4:97/29 5:122/29	5:101/132 34:1116/132
1:3/22	3:13/62		2:109/12	7:72/8	2:109/29 7:72/29	2:109/132 9:85/132
12:1001/22	17:1402/62			8:614/8	8:614/29	38:2247/132
		1:137/9	1:85/12		1:137/29 1:85/29	1:137/132 1:85/132
	4:77/62	1:2/9			1:2/29	12:146/132
1:165/22	1:165/62 1:3/62 3:10/62			1:3/8	1:3/29	1:165/132 2:6/132
17:799/22	22:859/62 4:80/62		1:11/12		1:11/29	4:21/132
			1:3/12	3:340/8 1:13/8	3:340/29 2:16/29	26:1216/132 6:96/132
			6:285/12		6:285/29	6:285/132
	1:10/62			7:105/8	7:105/29	8:115/132
7:117/22	12:149/62		1:17/12	7:78/8 4:442/8	8:95/29 4:442/29	20:244/132 4:442/132
				3:87/8	3:87/29	3:87/132
			1:12/12		1:12/29	1:12/132
	3:42/62	1:21/9	1:46/12		1:21/29 1:46/29	4:63/132 1:46/132
		1:12/9	3:52/12		1:12/29	1:12/132
4:165/22	7:178/62 4:14/62 1:2/62		7:1937/12		3:52/29 7:1937/29	3:52/132 14:2115/132
						4:14/132 1:2/132
11:551/22	16:678/62	4:500/9			4:500/29	20:1178/132
1:2/22	1:2/62 1:42/62	2:21/9			2:21/29	3:23/132 1:42/132
4:15/22	7:85/62 1:3/62		1:10/12		1:10/29	8:95/132 1:3/132
6:129/22	6:129/62		1:29/12		1:29/29	7:158/132
1:10/22	1:10/62			4:64/8	4:64/29	5:74/132
			2:21/12		2:21/29	2:21/132
				1:4/8	1:4/29	1:4/132
2:21/22	12:119/62 1:6/62					15:146/132 1:6/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Inter. Total	7	GRADE 8
Motion, Laws of.....						
Motors.					2:7/18	3:12/22
Mountains.....					1:3/18	
Music.....					2:10/18	5:97/22
Narcotics and Stimulants			1:13/12	1:13/41	3:42/18	5:25/22
Natural Forces.			1:53/12	1:53/41		1:3/22
Natural Resources... .						2:78/22
Nature, Balance of.....	1:12/14	3:341/15	5:43/12	9:396/41	1:2/18	2:14/22
Nervous System.....					2:102/18	4:37/22
Nitrogen.....					1:14/18	
Nitrogen Cycle.....						
Nomenclature.....						
Non-metals... ..						
Nutrients and Diets....						
Nostrums.....						2:21/22
Nutrition.....						
Oceans.....						
Organic Compounds....						
Organs.....						
Osmosis.....						
Oxidation and Reduction						
Oxides of Carbon.....						
Oxygen.....						
Oxygen and Oxidation. .		1:108/15	1:7/12	2:115/41	2:24/18	2:47/22
Oxygen, Hydrogen, and Oxidation.....						
Ozone.....						
Paint.					1:3/18	
Parasites and Saprophytes						3:28/22
Pascal's Law.....						
Pathogenic Organisms...						
Pendulum, Laws of.....						
Periodic Law.....						
Pests.....						5:93/22
Phosphorus.....						
Photoelectric Effect....						
Photography.....	1:16/14			1:16/41		3:13/22
Photosynthesis.....	1:6/14			1:6/41		
Physical Science	1:8/14		1:4/12	2:12/41		
Planets.....						9:185/22
Plant Groups .. .						

TABLE XVI (*Continued*)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
	5:19/62			2:13/8	2:13/29	2:13/132
	1:3/62			5:43/8	5:43/29	10:62/132
	7:107/62					1:3/132
2:27/22	9:94/62	1:17/9			1:17/29	7:107/132
2:31/22	3:34/62					11:124/132
1:29/22	3:107/62		1:7/12		1:7/29	4:87/132
2:19/22	5:35/62	1:3/9			1:3/29	4:114/132
4:53/22	10:192/62	6:129/9			6:129/29	15:434/132
	1:14/62		7:545/12		7:545/29	16:321/132
		1:2/9			1:2/29	8:559/132
		2:37/9	1:3/12		3:40/29	1:2/132
			8:1886/12		8:1886/29	3:40/132
		4:63/9	1:79/12		5:142/29	8:1886/132
1:8/22	3:29/62					5:142/132
		2:47/9			2:47/29	3:29/132
1:7/22	1:7/62		4:29/12			2:47/132
		1:10/9			4:29/29	1:7/132
					1:10/29	4:29/132
				3:18/8	3:18/29	1:10/132
			4:55/12		4:55/29	3:18/132
			6:170/12		6:170/29	4:55/132
			3:172/12		3:172/29	6:170/132
6:89/22	10:160/62		3:14/12		3:14/29	3:172/132
			4:136/12			15:289/132
			3:11/12		4:136/29	4:136/132
	1:3/62				3:11/29	3:11/132
	3:28/62	2:20/9			2:20/29	1:3/132
			2:9/12		2:9/29	5:48/132
		2:49/9			2:49/29	2:9/132
				2:8/8	2:8/29	2:49/132
			1:54/12	1:2/8	2:56/29	2:8/132
	5:93/62					2:56/132
			2:80/12		2:80/29	5:93/132
			1:3/12	2:8/8	3:11/29	2:80/132
4:47/22	7:60/62			3:13/8	3:13/29	3:11/132
						11:89/132
						1:6/132
						2:12/132
4:20/22	13:205/62					13:205/132
		1:116/9			1:116/29	1:116/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Inter. Total	7	GRADE 8
Planting.....						3:28/22
Plants and Animals... ..						2:123/22
Plants (Green).....	8:147/14	6:98/15	4:35/12	18:280/41	8:313/18	4:101/22
Plants (Simple).... .						4:63/22
Platinum.....						
Power and Power						
Devices... ..						1:33/22
Power (Water).....					4:31/18	4:28/22
Precipitation, Rain, Etc.					2:17/18	3:37/22
Prehistoric Plants and						
Animals.... .			1:18/12	1:18/41	2:5/18	1:5/22
Pressure.....	6:65/14	2:16/15	3:17/12	11:98/41	5:6/18	8:84/22
Primitive Man.....					1:8/18	
Proteins					1:16/18	
Queer Animals.....					1:9/18	
Radiant Energy.....					1:6/18	
Radiation and						
Absorption.....						
Radio						5:38/22
Radium and Radio						
Activity						
Rare Gases						
Reactions (Chemical)...						
Recreation and						
Exercise... ..					2:23/18	
Rectifiers (Electrical) ...						
Reflection and						
Refraction.....						1:6/22
Refrigeration... ..						
Reproduction.....	3:14/14	5:238/15	4:36/12	12:288/41	1:16/18	3:8/22
Reptiles.....	1:12/14	1:6/15	1:9/12	3:27/41	1:10/18	1:7/22
Respiration.....						1:18/22
Resonance.						
Response Organs						
Responses and Stimuli..						
Rivers.....						1:11/22
Rocks					10:261/18	5:111/22
Safety and First Aid....					2:45/18	4:211/22
Salmon and Other Fish..					1:6/18	
Sanitation.....	3:20/14	2:10/15	2:11/12	7:41/41	3:8/18	8:249/22
Science and the						
Consumer						

Courses in Science

87

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
	3:28/62					3:28/132
	2:123/62	1:56/9			1:56/29	3:179/132
7:124/22	19:538/62	4:745/9			4:745/29	41:1563/132
	4:63/62	2:15/9			2:15/29	6:78/132
			2:80/12		2:80/29	2:80/132
5:95/22	6:128/62					6:128/132
	8:59/62			2:6/8	2:6/29	10:65/132
	5:54/62					5:54/132
	3:10/62					4:28/132
4:28/22	17:118/62			3:32/8	3:32/29	31:248/132
	1:8/62					1:8/132
	1:16/62		3:55/12		3:55/29	4:71/132
	1:9/62					1:9/132
	1:6/62					1:6/132
				1:2/8	1:2/29	1:2/132
4:79/22	9:117/62			5:77/8	5:77/29	14:194/132
			1:50/12	6:40/8	7:90/29	7:90/132
			1:4/12		1:4/29	1:4/132
			2:22/12		2:22/29	2:22/132
	2:23/62	1:16/9			1:16/29	3:39/132
				2:17/8	2:17/29	2:17/132
2:69/22	3:75/62			7:121/8	7:121/29	10:196/132
1:6/22	1:6/62			2:10/8	2:10/29	3:16/132
2:35/22	6:59/62	7:383/9			7:383/29	25:730/132
	2:17/62					5:44/132
3:20/22	4:38/62	3:91/9			3:91/29	7:129/132
				2:8/8	2:8/29	2:8/132
		1:6/9			1:6/29	1:6/132
		4:22/9			4:22/29	4:22/132
	1:11/62					1:11/132
4:30/22	19:402/62					19:402/132
6:140/22	12:396/62			1:4/8	1:4/29	13:400/132
	1:6/62					1:6/132
4:18/22	15:275/62	1:3/9			1:3/29	23:319/132
			1:13/12		1:13/29	1:13/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Inter. Total	7	GRADE 8
Scientific Age.....					2:7/18	1:4/22
Scientific Methods... ..	1:3/14	1:5/15	3:21/12	5:29/41	3:31/18	
Seasons.....	4:58/14	1:18/15	2:40/12	7:116/41		3:24/22
Seeds.....					1:7/18	1:2/22
Shelter						4:291/22
Silver.....						
Skeleton and Muscles .					2:30/18	3:37/22
Skin.....						1:11/22
Soaps.....						
Social Effects.....					4:61/18	4:33/22
Sodium.						
Soil		1:17/15	1:4/12	2:21/41	9:265/18	10:182/22
Solar System.....	4:40/14	3:32/15	6:89/12	13:161/41	2:156/18	12:185/22
Solutions (Colloidal)....						
Solutions (Kinds). . . .						
Solutions (True).. . .						
Sound	2:11/14	1:12/15	1:10/12	4:33/41	1:3/18	3:417/22
Specific Gravity and Density.....						
Specific Heat.....						
Spectroscope.....						
Stability.....						
Stars and Constellations.	5:42/14	5:91/15	5:79/12	15:212/41	3:32/18	15:257/22
Storms (Local and General).....			1:8/12	1:8/41	7:65/18	1:25/22
Sub-atomic Energy.....						
Sulfur.....						
Sun.....					1:3/18	5:61/22
Superstitions.....					2:10/18	7:38/22
Surface Tension.....						
Synthesis.						
Steam.....			1:8/12	1:8/41		
Telegraph and Telephone						3:28/22
Terminology						1:5/22
Textiles		1:33/15		1:33/41	3:59/18	
Thermometry						4:14/22
Time.....						4:23/22
Tin.....						
Tissues (Animal and Plant).....						
Transformers.....						2:8/22
Trees.....	3:96/14	6:111/15	5:65/12	14:272/41		

Courses in Science

89

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
2:25/22	5:36/62					5:36/132
	3:31/62		2:10/12		2:10/29	10:70/132
	3:24/62					10:140/132
	2:9/62	2:17/9			2:17/29	4:26/132
1:9/22	5:300/62					5:300/132
			1:44/12		1:44/29	1:44/132
1:5/22	6:72/62	4:111/9			4:111/29	10:183/132
1:2/22	2:13/62					2:13/132
1:10/22	1:10/62		5:38/12		5:38/29	6:48/132
5:37/22	13:131/62	3:22/9	3:102/12	1:66/8	7:190/29	20:321/132
			7:308/12		7:308/29	7:308/132
12:194/22	31:641/62					33:662/132
9:58/22	23:399/62					36:560/132
			5:164/12		5:164/29	5:164/132
			5:109/12		5:109/29	5:109/132
			3:101/12		3:101/29	3:101/132
14:431/22	18:481/62			7:229/8	7:229/29	29:743/132
			1:5/12		1:5/29	1:5/132
				2:6/8	2:6/29	2:6/132
			1:4/12		1:4/29	1:4/132
				1:3/8	1:3/29	1:3/132
10:74/22	28:363/62					43:575/132
	8:90/62					9:98/132
			1:2/12		1:2/29	1:2/132
			8:528/12		8:528/29	8:528/132
3:28/22	9:92/62					9:92/132
1:2/22	10:50/62	2:8/9			2:8/29	12:58/132
				1:6/8	1:6/29	1:6/132
			3:32/12		3:32/29	3:32/132
						1:8/132
2:5/22	5:33/62			4:15/8	4:15/29	9:48/132
	1:5/62	1:6/9	2:65/12		3:71/29	4:76/132
3:57/22	6:116/62		1:28/12		1:28/29	8:177/132
5:57/22	9:71/62			6:79/8	6:79/29	15:150/132
	4:23/62			1:3/8	1:3/29	5:26/132
			3:191/12		3:191/29	3:191/132
		1:9/9			1:9/29	1:9/132
1:2/22	3:10/62			4:34/8	4:34/29	7:44/132
						14:272/132

TABLE XVI (Continued)

Major Topic	4	GRADE 5	6	Inter. Total	7	GRADE 8
Transportation.....					3:11/18	4:101/22
Water	3:47/14	3:65/15	2:10/12	8:122/41	9:505/18	12:903/22
Water and Solutions. . .						1:9/22
Water Cycle.....					7:100/18	4:28/22
Water Life.....					4:37/18	3:27/22
Water Purification					2:9/18	
Water Supply.....					8:125/18	9:172/22
Water (Heavy)						
Water Systems (Home) .					4:99/18	
Weather.....	2:91/14	1:23/15		3:114/41	1:9/18	
Weather and Climate . .	2:20/14	5:63/15	5:50/12	12:133/41	6:463/18	12:545/22
Weather Bureau.....					1:2/18	2:14/22
Weathering and Erosion.					3:37/18	2:34/22
Work						4:22/22
Work and Power.....						
Work-Power and Machines.....						
Universe.....						3:23/22
Valence.....						
Variation (Living Things)			2:8/12	2:8/41	2:10/18	
Vertebrates.....						
Vitamins.....					1:4/18	
Vocations.....						1.137/22
Voice and Ear						1:5/22
Volcanism					1:3/18	2.8/22
X-Ray.....						
Yeasts.....						
Zinc						
Zones, Climatic.....					1.6/18	
Zones, Life.....						

TABLE XVI (Continued)

GRADE 9	Jr. H. S. Total	Biology	Chemistry	Physics	Sr. H. S. Total	Grand Total
7:243/22	14:355/62			1:5/8	1:5/29	15:360/132
16:498/22	37:1096/62		1:5/12	2:12/8	3:17/29	48:2045/132
1:22/22	2:31/62		5:1310/12		5:1310/29	7:1341/132
4:16/22	15:144/62					15:144/132
	7:54/62	3:86/9			3:86/29	10:140/132
8:63/22	10:72/62		8:83/12		8:83/29	18:155/132
	17:297/62					17:297/132
			1:3/12		1:3/29	1:3/132
	4:99/62					4:99/132
2:15/22	3:24/62		1:2/12		1:2/29	7:140/132
6:279/22	24:1287/62					36:1420/132
	3:16/62					3:16/132
1:9/22	6:80/62					6:80/132
11:116/22	15:138/62			1:2/8	1:2/29	16:140/132
				8:58/8	8:58/29	8:58/132
				3:116/8	3:116/29	3:116/132
1:11/22	4:34/62					4:34/132
			7:87/12	1:2/8	8:89/29	8:89/132
	2:10/62	6:174/9			6:174/29	10:192/132
1:93/22	1:93/62	4:181/9			4:181/29	5:274/132
	1:4/62	1:34/9	1:7/12		2:41/29	3:45/132
1:11/22	2:148/62	2:9/9			2:9/29	4:157/132
5:54/22	6:59/62			3:11/8	3:11/29	9:70/132
2:9/22	5:20/62					5:20/132
				3:11/8	3:11/29	3:11/132
6:129/22	6:129/62	1:14/9			1:14/29	7:143/132
			1:13/12		1:13/29	1:13/132
	1:6/62					1:6/132
		2:117/9			2:117/29	2:117/132

of seven for "Fire" would be included with the major topic "Fire" and also with the major topic "Air" under which it occurred.

Actually, the amount of such duplication is small when the total number of items is considered. Since one of the purposes of this report is to show the extensiveness of the treatment of each major topic or subtopic by means of the index of significance, such duplication in counting seems justifiable on the ground that in every case where there was duplication the unit, major topic, or subtopic, actually existed. Thus where fire was mentioned in connection with air, it was deemed not only justifiable but mandatory to count as items both "Fire" and "Air." Therefore the total item count for a topic given in the indexes of significance truly represents the total number of times that particular topic was mentioned as an item in courses examined in this investigation.

When using the indexes of significance found in the master unit-topic chart or the unit-topic charts for each of the grades, one must remember that the ratio of the number of courses in which a unit or major topic occurs to the total number of courses analyzed does not necessarily indicate that the topic does not occur as a minor topic in other courses. For example, "Acceleration" occurs as a major topic or a unit title in only two of the eight courses of study in physics which were analyzed in this study. This statement does not mean that only two out of eight courses included the topic "Acceleration"; it means that the topic "Acceleration" was placed in a position of major importance in only two of the eight outlines.

One must also remember that the total number of items for a major topic or unit heading, and for a subtopic, may derive the larger portion of its items from a comparatively few courses. For example, the topic "Evolution and Heredity" has an index of significance of 7:679/9. One course out of seven treating this topic contains 355 items, constituting more than one-half the total. These qualifications must be kept in mind when interpreting the master unit-topic chart, although the instances in which they apply are relatively few.

TRENDS IN CONTENT OF SCIENCE COURSES

An analysis of the master unit-topic chart (Table XVI) reveals certain interesting and significant trends with respect to the content of the science courses which were analyzed.

1. Topics related to the field of astronomy receive practically no consideration in the senior high school, but in the intermediate grades (under solar system) and the junior high school they are treated rather extensively. Only two of the twenty-nine senior high school courses include units or major topics on astronomy, and the solar system is not mentioned as a unit, major topic, or subtopic. In the junior high school, however, thirty-three of sixty-two courses include units or major topics on this phase of science. In the intermediate grades thirteen of forty-one courses include a unit or a major topic on the solar system. This topic is found as a subtopic in twenty-three of the junior high school courses.

2. A similar situation prevails with reference to "earth sciences." Unit topics, major topics, and subtopics related to "earth science" occur in twenty of the forty-one courses for the intermediate grades and in twenty-four of the sixty-two junior high school courses, but in none of the senior high school courses.

3. The unit topics or major topics in courses for the intermediate grades generally have a more limited scope than do those of the junior or senior high schools. This statement may be illustrated by the fact that the topic "Animals" occurs in eleven of the forty-one intermediate school courses, whereas the topic "Animal Kingdom" does not appear in the intermediate school courses at all but is found in five of the nine courses in biology in which occur a large number of items devoted to this broader topic. This comparison in general holds true for other topics.

4. Relatively few courses of study include, in addition to important science topics, the kind of topics or units which, in the light of world affairs, should be treated not only in science but in other fields of interest as well. For example, "Transportation" occurs in only fifteen of the 132 courses analyzed, with a total count of 360 items. Of these fifteen courses only one is in the senior high school. "Communication" occurs in only fifteen of the 132 courses analyzed, with a total of 268 items. Only one of these courses is for the senior high school. "Conservation" as a major topic occurs at seven different grade levels in twenty-two of the 132 courses. Certain broad topics, however, are occasionally found in the various courses analyzed. "Foods," for example, occurs as a unit topic or major topic in forty-nine of the 132 courses and on six different grade levels. A study of this topic as presented in the separate courses reveals that the treatment of this partic-

ular topic varies from the extremely academic approach to one based upon the actual daily nutrition of boys and girls.

5. An inspection of the indexes of significance showing the relative emphasis in general science at the ninth grade level on materials from the fields of biology and physical science indicates that there are 60 per cent more major topics related to physical science than to biological science; and that there are 25 per cent more major and minor items devoted to physical science than to biological science at this grade level.⁵ It is well to point out that while this statement is true in general there are some courses of study in which this emphasis is reversed.

6. No single unit topic or major topic appears at all grade levels. Energy, environment, and water are dealt with at eight different grade levels. Animals, conservation, historical materials, insects, machines, magnetism and electricity, balance of nature, green plants, pressure, "reproduction and sanitation" occur at seven different grade levels. Air movement, birds, physical and chemical changes, earth science, food, garden, living things, mammals, oxygen and oxidation, social effects, sound, solar system, and weather and climate occur at six different grade levels.

7. A distinct lack of agreement is apparent with respect to the sequence of science materials in the various science courses analyzed, either from grade to grade or within a single grade level. Main topics on water, for example, are just as likely to be the first unit in the seventh grade course as the eighth unit in the ninth grade course. This lack of agreement concerning grade placement among makers of courses of study may be due in part at least to the lack of scientific evidence regarding the placement of science materials in the intermediate schools and in the junior and senior high schools.

8. It is interesting to note that in twenty of the 132 courses the topic "Social Effects of Science" was considered of sufficient importance to be placed in the outline as a major topic or unit title. All of these twenty courses were for the junior or senior high school.

TOPICS OCCURRING IN TWENTY-FIVE OR MORE SCIENCE COURSES

A study of the master unit-topic chart was made in order to obtain a list of major topics which occurred in twenty-five or more of the 132

⁵ Derived from indexes of significance.

courses of study. The topics, together with the total number of items devoted to each, are given in Table XVII. Examination of this table shows

TABLE XVII

*List of Topics Which Occur in Twenty-five or More Courses of Study**

Topic	Number of Courses	Number of Items
Food.....	49	1,913
Water.....	48	2,045
Living Things	46	3,232
Earth Science.....	44	1,629
Stars and Constellations	43	575
Plants (Green)	41	1,563
Historical Materials.....	40	478
Health.....	39	1,614
Magnetism and Electricity.....	38	2,247
Air (Atmosphere).....	37	1,852
Solar System.....	36	560
Weather and Climate	36	1,420
Astronomy.....	35	1,769
Heat.....	34	1,525
Light.....	34	1,459
Machines	34	1,116
Soil	33	662
Pressure	31	248
Energy.....	30	447
Insects.....	30	837
Sound.....	29	743
Disease	27	719
Animals	26	780
Fire.....	26	968
Introduction	26	761
Matter.....	26	1,216
Reproduction.....	25	730

* Data from Table XVI: Master Unit-Topic Chart.

that (1) only twenty-seven of the 400 major topics found on the master unit-topic chart occurred in twenty-five or more courses; (2) the number of courses which treat the first topic "Food" is nearly twice the number which treat the twenty-seventh topic "Reproduction"; (3) the third topic "Living Things" appears with nearly six times as great a frequency as does the fifth topic "Stars and Constellations." This apparent lack of similarity of content among these 132 courses is

partly to be expected in view of the fact that the courses represent nine different grade levels. Variations and similarities among the various courses on a given grade level with respect to the topics treated can be detected only by a close study of the master unit-topic chart.

NUMBER AND RANGE OF UNITS OR MAJOR TOPICS

Table XVIII shows the average number and range of units or major topics per course and per grade. The average number of unit topics or

TABLE XVIII

Average Number of Units or Major Topics per Course and per Grade

Grade	Average Number of Units or Major Topics per Course	Range of Numbers of Units or Major Topics per Course	Average Number of Units or Major Topics Together with Subtopics
Grade 4.....	9.0	2-15	38
Grade 5.....	8.0	5-13	46
Grade 6.....	9.0	2-12	45
Grade 7.....	8.0	3-21	142
Grade 8.....	7.6	3-21	182
Grade 9.....	9.0	3-15	153
Biology.....	9.6	5-14	90
Chemistry.....	10.9	4-20	143
Physics.....	10.6	6-17	91

major topics per course is about the same for all grade levels; but the range of numbers of units or major topics varies somewhat from grade to grade. The smallest range, it will be seen, is in the fifth grade and the widest range in the seventh and eighth grades.

The differences in the number of units or major topics among courses are due not so much to differences in the content of the courses as to variation in the scope of material included in each unit or major topic. For example, one course may have a unit or major topic on "Plants," while another may have more limited unit topics or major topics on "Green Plants," "Simple Plants," and the "Economic Importance of Plants." The wide range in number of units or major topics in chem-

istry and physics in some of the courses apparently results from organizing the content around the chapter headings of textbooks.

If the scope of material is judged by the average number of units, major topics, and subtopics, the range and variety of problems and subjects included in science courses are great. The average number of units, major topics, and subtopics appearing at each grade level is shown in the last column of Table XVIII. These figures would seem to indicate that science has a greater scope in the eighth grade than at any other grade level, and that science in the junior high school, as judged by the data of this study, has over three times as wide a range of material as has science for the intermediate school. In the senior high school, chemistry apparently has the broadest scope, since it includes nearly 65 per cent more topics than does physics or biology. Again, however, one must guard against too broad an interpretation of these data since the number of topics varies greatly for the different courses. For example, the courses examined ranged from two or three typed pages of content to more than fifty pages, even when dealing with the same subject matter.*

OVERLAPPING OF CONTENT BETWEEN AND AMONG GRADES

A study of the master unit-topic chart indicates much overlapping of the content for different grade levels, especially between ninth grade general science and physics, chemistry, and biology in the senior high school. Among the topics that occur with considerable frequency in both general science and physics are: *heat, light, machines, magnetism, electricity, measurements, and radio*. The topics which occur in both ninth grade general science and biology include: *environment, health, adaptation and control, disease, microorganisms, nervous system, and interdependence*. The topics which occur in both general science and chemistry include: *food, metals, oxygen and oxidation, and science in everyday life*. Topics occurring frequently in both chemistry and physics include: *change of state, chemical and physical changes, gases, heat, matter and energy, radium and radio activity*. Topics occurring most frequently in both biology and chemistry include: *diet, food, vitamins, and nutrients*. Only one topic, *energy*, occurs in both physics and biology.

* The reader is reminded that in this study a course is defined as material for one grade.

There seems to be some overlapping between the various grades in the junior high school. Duplication occurs most frequently in the content of the seventh and ninth grades and in that of the seventh and eighth grades. This overlapping was not expected, for many of the junior high school courses of study are organized as two-year or three-year sequences. Overlapping between junior and senior high school courses was to be expected to some extent, inasmuch as the topics which overlap are treated from a different point of view in the departmentalized and specialized senior high schools and in the more general junior high schools.

Implications of this overlapping which seem justifiable may be summarized as follows:

1. Topics treated in general science are usually selected, or tend to be selected, on the basis of their contributions to the pupil's understanding of the environment. In physics the materials are organized around logical divisions of the subject. In many respects the courses in physics contain about the same material and are organized in the same manner as the physics courses were organized twenty or thirty years ago. This kind of development frequently involves concepts, principles, and facts utilized more or less extensively in the junior high school courses in general science. Overlapping between these two kinds of courses will continue until makers of courses of study in physics pay more attention to what is included in general science.

2. Although the overlapping of the content of biology and general science, and of chemistry and general science is not so extensive as the overlapping of the content of general science and physics, nevertheless it seems to indicate that each course has been prepared without reference to the other courses to be offered in the same school. The situation suggests that it would be profitable to construct each course in the light of the total six-year program for the junior and senior high school. Then overlapping thought to be necessary for the proper re-enforcement of learning could be included and all unnecessary overlapping eliminated.

SELECTION AND ORGANIZATION OF SUBJECT MATTER CONTENT

A study of the outlines of subject matter for the 132 courses of study analyzed reveals quite clearly a lack of uniformity in the

manner in which content was selected and organized by makers of courses of study. Since it was difficult, or even impossible, to determine from the outlines just what these differences were, a supplementary study was made of certain selected original courses. This supplementary study included a careful consideration of the stated objectives, the methods of organizing and developing the subject matter, the indicated scope and sequence, the suggested activities, and the bibliographies.

The sixty-one courses of study chosen for this intensive examination were among those designed for the junior and senior high schools. They included twenty-three courses in general science (eleven one-year courses, seven two-year courses, and five three-year courses), seven courses in biology, seven courses in chemistry, and seven courses in physics.

The word *scope* as used here refers to the breadth of the course, that is, the range of materials and of subject matter. *Sequence* refers to the order and arrangement of materials. Obviously, a predetermined sequence frequently fixes the scope or breadth of a course of study. This statement is especially true with respect to the so-called "subject curriculum." Here the subject matter tends to be logically organized around objectives and values inherent in the subject matter itself. The scope of the subject matter thus organized tends to be narrow, since interaction with other subject areas is limited.

Emphasis on the logical development of subject matter, with its resulting narrowing effect on scope, is most noticeable in the specialized sciences, namely, physics, chemistry, and biology. It is least noticeable in the courses of study for general science. All the courses in general science with the exception of one tend to emphasize functional values, with a resulting greater attention to social applications than to predetermined sequences. This tendency has resulted on the whole in richer content and in increased emphasis on the interrelationship of learnings. In physics, chemistry, and biology the subject approach to the selection of content is employed almost exclusively by the various makers of the courses of study. In all these courses, regardless of the methods employed in organizing the content, the tendency is to stress logical sequence and to limit the scope to what one considered to be the demands of this logical development. Some of the differences noted in the various courses of study undoubtedly stem from differences in the attitudes of makers of courses of study with

respect to scope and sequence. It seems evident that all the general science courses were intended to include broad fields; that is, these courses were intended to include materials from many of the sciences. It seems equally clear that all the specialized science courses were intended to be limited to a more or less logical development of a particular subject. One must remember, however, that although this distinction between the specialized science courses and the general science courses can be made, nevertheless certain qualifications must be kept in mind. Methods and procedures used in the special sciences have been utilized to a considerable extent in general science. In some cases this practice tends to limit the full development of the possibilities inherent in the selection of content on the basis of its contributions to broad understandings. Support for this statement is provided especially in those sections of the general science courses of study which deal with subject matter similar to that in the special sciences. For example, the following unit on "Light" was found in a ninth grade general science course:

ILLUSTRATION 10

Unit II. Light

- | | |
|-------------------------|---------------------|
| A. Nature of light | F. Refraction |
| B. Velocity of light | G. Colors |
| C. Measurement of light | H. Shadows |
| D. Artificial lighting | I. Photography |
| E. Reflection | J. Process of sight |
| K. Illumination | |

It is apparent that in this unit the scope of the subject matter on Light has been dictated by the emphasis placed on the logical or topical development of the materials, just as it is in most physics courses of study. When this is contrasted with the treatment of light in a unit on "Light in the Home" (Illustration 11), where the emphasis is placed on understanding and solving problems related to illumination of the home, it can be seen how the use of the methods of special sciences may limit the breadth of the treatment of materials in general science.

The second of these units (Illustration 11) exemplifies a typical approach to the use of subject matter in general science.

The differences between courses of study in the special sciences and courses of study in general science as reported here are further revealed by an analysis of the suggested activities and suggested bibliographies.

ILLUSTRATION 11

Unit XI. Light in the Home

I. Correct Artificial Light in Our Homes

- A. Arrangement of electric lights
- B. Amount of light
- C. Reflected light
- D. Other factors affecting light
- E. Kinds

II. Using Natural Light

- A. Sources
- B. How houses are lighted by the sun
- C. Objects which light waves strike
- D. Factors determining proper lighting

In the courses which were considered to be organized as broad fields (general science courses), the suggested activities, in the opinion of the project staff, tended to be varied in nature and not restricted to types associated exclusively with the intellectual processes. Twelve of the forty general science courses studied contained suggested activities which were considered by the project staff to be varied in nature and rich in possibilities for extending the pupils' horizons. All the courses in the special sciences were judged to have employed activities mostly of the academic type. A similar situation prevails with respect to the bibliographies. Ten of the forty courses in general science gave evidence (through their suggestions for reading) of a desire to extend the pupils' horizons far beyond the usual limits set by the subject matter included in the courses. Very few of the courses in the special sciences had bibliographies which would extend a pupil's horizon beyond the requirements which were set by the subject matter outlined.

Differences in emphasis with reference to scope and sequence are, in the investigators' opinion, one of the chief reasons for the differences in the courses of study in the special sciences and in general science. In general it can be said that the courses of study in the special sciences tend to emphasize logical development of subject matter. One must remember, however, that many sections of the courses of study in general science tend also to emphasize sequence rather than scope. In practically all these cases it appears that the sections that emphasized sequence rather than scope were taken bodily from the special sciences.

INTERNAL ORGANIZATION OF SCIENCE COURSES

Considerable superficial variation with respect to the use of topics and units and with respect to methods of developing these topics and units was apparent in the courses examined in this supplementary study. Most courses appeared to have different plans for organizing the content, even though the content was similar to that found in other courses of study. This statement is particularly true with respect to the methods of organizing or developing the topics or units.

Thirty-five of the forty courses in general science, all the courses in biology, four of the seven courses in chemistry, and two of the seven courses in physics called the various divisions "units" and attempted to organize them as such. Five of the forty courses in general science, two of the seven courses in chemistry, and five of the seven courses in physics developed or outlined their content in the form of topics and subtopics. In many cases it was difficult to detect any differences between the courses with unit organization and the courses organized by topics. In all cases decision on what constituted a unit and what

ILLUSTRATION 12

I. Sound

I. Source

- A. Rapidly vibrating bodies
- B. Regular and irregular vibration: musical sound, noise
- C. Frequency \AA

II. Origin and Transmission of Waves

- A. Formation of a wave
- B. Wave length \AA 1
- C. Waves per second \AA

.

III. Musical Instruments

- A. Percussion: drums, cymbals
- B. Stringed instruments
- C. Air jet instruments: pipe organ, whistle, flute, piccolo, fife

.

- F. Free reeds: mouth organ, accordion, reed organ

- G. Phonograph

XVIII. Radio-Speaker

XIX. Telephone

ILLUSTRATION 13

UNIT II. THE LIVING GREEN PLANT

Unit Objective

Life is dependent on food, and all food comes originally from green plants.

Specific Objectives

1. Food comes directly and indirectly from green plants.
2. Parts of a typical green plant and the function of these parts.

.

28. Structure of typical monocot and dicot seeds.
29. What foods are stored in seeds.
30. Value of seeds to men.

Teaching Procedures

1. Review briefly the processes carried on by living things. Show that food is required to carry on these processes and that if life is to continue there must be some place where food is manufactured (green plant).

2. Use any common plant on hand, such as geranium, and give gross presentation of a plant as a working unit, having a purpose in life.

3. Take up briefly the parts of a green plant, roots, stem, leaves, and flowers. Study briefly the various forms of each and their chief functions.

.

13. Summarize the work of green plants. The summary can be worked out as a class problem or each pupil asked to list facts learned about green plants or an outline worked out covering the work of the unit.

14. Some form of an objective test given to check on the unit

15. From knowledge gained in the study of this unit write a brief but accurate paper on "Why We Eat Sunshine"

Pupil Activities

1. List plants used for food. If possible look up the amounts of each produced a year and make a graph to show this information.

2. Select twenty or more definite statements from a botany or biology book about the use of plants to man and make up a set of true-false questions.

.

27. List at least 100 concepts from their work on the green plant.

28. Try various forms of grafting.

29. Outline and summarize the work of the unit on green plants.

Evidences of Mastery

1. In what ways are green plants useful to man?
2. To know the parts of a higher plant, roots, stems, leaves, and flowers, and know the functions of each part.
3. Know the differences in annuals, biennials, and perennials.

.

21. To recognize all parts of a complete flower (calyx, corolla, pistil, stamens).

22. To know all flowers are not complete.

23. To know the meaning of dioecious, monoecious, staminate, and pistillate flowers.

constituted a topic was inferred from the terminology used in the course of study. For example, if the different sections of the course of study were labeled "units," it was assumed for the purposes of this study that the course employed the unit organization. There was greater variation in the methods used in organizing the units than in the methods used in organizing the topics. Most of the courses organized on the topic plan presented an outline of the content, and in certain cases additional material on teaching procedures, pupil activities, etc. The courses organized on the unit plan employed a variety of methods in handling the unit itself. The illustrations given below will aid in making clear the types of methods used in the courses of study examined. Illustration 12 is an excerpt from a course of study in physics. It is a typical example of the topic plan of organization, which in most cases appears to be an outline of content.

Illustration 13 is an excerpt from a course of study in biology. It can be seen that use is made of specific objectives, which in this case amounts to nothing more than an outline of subject matter. It is interesting to note the type of items included under "Evidences of Mastery." These appear to be counterparts of the specific objectives stated in more specific terms.

Illustration 14 is an excerpt from a course of study in general science, exemplifying one of the recent types of organization in which the development of understandings, concepts, and generalizations is made the objective of the course.

ILLUSTRATION 14

Unit IV. Making Science Useful in the Home

I. Suggestions Concerning Purposes

A. Science Understandings

1. Certain physical conditions are limiting factors of life.

.

4. Certain disease-producing microorganisms are transmissible.

B. Social and Human Implications

1. Science has furnished materials for equipping homes to give better protection from adverse weather conditions.
2. Improvements in publications, transportation, and instruments for reproducing sound add materially to the aesthetic values of the home.

ILLUSTRATION 14 (Cont'd)

- II. Overview
 . . .
- III. Suggestive Approaches
 . . .
- IV. Suggestive Problems and Activities
 . . .
- V. References
 . . .

Illustration 15 is an excerpt from a course of study in chemistry having a unit organization in which both science generalizations and the specific objectives are employed as organizing centers.

ILLUSTRATION 15

Unit II. The Importance of Oxygen in Our Daily Lives

Generalization

1. Matter and energy cannot be created or destroyed but may be changed from one form to another.
2. Chemical and physical changes are manifestations of energy changes.

I. Objectives

- A. To learn that oxygen in the air is essential to living organisms and in certain natural processes.

. . .

- D. To acquire skill in observing and drawing conclusions from laboratory reactions.

II. Teaching Units

. . .

III. Procedure

- A. Overview
- B. Suggested approaches
- C. Suggested classroom and laboratory activities
- D. Class experiments
- E. Voluntary activities

IV. References

V. Desired Outcomes

- A. Knowledge and understanding
- B. Habits and skills
- C. Attitudes and appreciations

VI. Tests to Measure Certain Outcomes

The illustrations represent a few of the plans used in organizing a unit or a topic. Other plans were employed, but no fundamental differences in content were observed. However, the plan of organiza-

tion adopted in some courses of study indicates that the makers of these courses believe that a bare outline of subject matter is not sufficient. It seems reasonable to infer that they are convinced that the course of study should include suggestions for teaching, for pupil activities, and for evaluation, and an extensive bibliography, as well as an outline of content. This, in the investigators' opinion, is the most valuable and noteworthy improvement in course of study construction in the field of science.

OBJECTIVES FOUND IN SCIENCE COURSES

Table XIX shows the kinds of objectives found in the supplementary study in the various courses of study and their frequency of occurrence.

TABLE XIX

Kinds of Objectives Found in the Various Courses of Study Included in the Supplementary Study and Their Frequency of Occurrence in the Various Courses

Objective	General Science	Biology	Chemistry	Physics	Total
General Education	16	2	3	3	24
Secondary School.....	5	3	1	1	10
General Objectives for Science.....	4	1	5	5	15
Specific Subjects.. ..	36	7	4	3	50
None.....	4			1	5

The classification used here is the same as that followed in the various courses of study: namely, "General Educational Objectives," "Objectives of the Secondary School," "General Objectives of Science Teaching," etc.

Four types of objectives were found. Some of the sixty-one courses included all four types, others contained only one type, and five made no mention of objectives at all. Only twenty-four of the sixty-one stated general educational objectives and more interestingly only fifteen mentioned general aims of science. Fifty mentioned aims or objectives for a specific object, namely, general science, physics, etc. The expectation would be that all the courses would at least mention or state objectives for the specific course to be developed or outlined.

An effort was made to discover whether or not the objectives stated would influence the selection and organization of the content. With few exceptions it can be said that it was most difficult, if not impossible, to ascribe differences in the manner in which the content of the various courses had been selected and organized to differences in the stated objectives. For example, two courses with similar objectives might represent different plans of organizing the content, although the content in both cases might be similar. Moreover, courses with differently stated objectives or no objectives at all might have similar content and might represent similar plans of organizing this content.

The most marked effect of objectives on the selection and organization of content was evident in courses subscribing to the Seven Cardinal Principles of Education⁶ or to the principles suggested in the *Thirty-First Yearbook of the Society for the Study of Education*.⁷ In each case an attempt was made to implement principles laid down in these reports. It has been suspected that the Seven Cardinal Principles were as dead as Pharaoh, but such proved not to be the case. It has also been believed that more of the courses published since 1932 would reflect the findings and suggestions of the *Thirty-First Yearbook*. The effects of both reports were most clearly seen in the organization of the courses rather than in the selection of content.

For example, a comparison was made of two courses. One used the topic method of organization; the other used units built around important science concepts and generalizations. Very little difference was discovered in the actual content used. This statement does not mean that the method of organizing subject matter around interpretive generalizations has no value. What it does suggest is that this method may provide a more effective means of organizing the subject matter in the various science fields without radically changing the content. A study of stated objectives reveals little evidence to justify the inference that the makers of the courses of study here analyzed see any clear relation between general objectives and the selection and organization of the subject matter content or that, if

⁶ U. S. Department of the Interior, Bureau of Education. *Cardinal Principles of Secondary Education*. Bulletin, 1918, No. 35. Washington, D. C.: Government Printing Office, 1918.

⁷ *Thirty-First Yearbook of the National Society for the Study of Education*. Part I. "A Program for Teaching Science." Bloomington, Ill.: Public School Publishing Company, 1932.

they do, they do anything about it. A comparison of stated objectives with the course outlines does not show that the selection of content is influenced to any considerable extent by the objectives stated.

SOME CONCLUSIONS

The complete data which are briefly summarized in the preceding sections of this chapter are too voluminous for detailed reporting. Certain conclusions which the detailed data support, but which the content and summarized data in the tables do not always reveal, are recorded here.

1. Some attention is being given to the problem of sequence of science materials. This sequence is most evident in the junior high school, where nine of the thirty-three courses were organized as a three-year sequence, eleven as a two-year sequence, and thirteen on a one-year basis. The three-year sequences contained practically no overlapping; this is true also of the two-year sequences. There seems to be little general agreement or few principles to guide makers of courses of study in the placement and sequence of science materials either with respect to grade level (except in the junior high school) or with respect to their places within the course for any given year. For example, the unit "Water" may appear as the first unit in one course of study and as the seventh unit in another. Physics courses, and to some extent biology and chemistry courses, show closer agreement than general science courses with respect to the sequence of material. This agreement is especially noticeable in the courses in physics; however, this fact does not mean that such consistency as is detected in the arrangement or sequence of science materials is the best sequence or even a desirable sequence.

2. Practically all courses of study in the intermediate grades and junior high schools are now including considerable materials from the fields of astronomy and earth science. This procedure seems sound in view of the wealth of meaningful and interesting experiences available in the two areas and their possibilities for integration or correlation with such areas as geography and agriculture. Practically no attention, however, is paid to either astronomy or earth science in any of the specialized sciences in the senior high school. This practice seems unwise in view of the possibilities for enriching the specialized courses.

3. There is evidence of a general tendency for the content of more recent courses in senior high school science (namely, physics, chemistry, and biology) to be less rigorously confined within the limits of these special fields than is the content of earlier courses in these same subjects. For example, some of the courses in biology contain materials on foods, developed in the main from the standpoint of the consumer. Such units are developed to utilize materials from fields other than biology. Another example of this tendency is shown in a course in physics which devotes considerable space to the development of the economic and social aspects or implications of the materials of physics.

4. The environmental approach is attempted extensively in the selection and organization of the learning materials of junior high school science. The interpretation of the environment seems to be the chief theme, although the various units are developed largely by methods closely related to the methods used in the special sciences. This apparent inconsistency is to be expected during the period of transition from science *per se* to science as an aid in the interpretation of the physical, biological, and social environment. The environmental approach is also found in a majority of the courses in science for the intermediate school.

5. There is some evidence to show that makers of courses of study are becoming more conscious of the needs and interests of students of science. This is most evident in courses which devote considerable space to suggestions for pupil problems, experiments, projects, and similar activities. Many of these activities are stated in such form as to indicate the need for integrating materials from more than one field of knowledge. The attempt to meet the needs and interests of students is least evident in courses which are restricted to the bare outline of subject matter and required experiments. For example, in the field of physics, most of the courses of study are restricted to an outline of subject matter and suggested experiments. In these courses the emphasis is placed on the logical development of the subject matter; few if any suggestions for pupil activities are found. The activities which are given are restricted to problems peculiar to physics. In some instances the activities involve practical applications, but in many of the suggested activities not even this broadening aspect of physics is indicated.

6. Consumer education receives little or no attention in the courses of study examined. Only one course included a unit pertaining to the

consumer. Certain units, such as health, food, and clothing, contain references (mostly indirect) to consumer problems, but generally even here the academic approach is used, which, in the investigators' opinion, militates against a full consideration of all the factors and values involved. Also it appears that even in the unit devoted to the consumer the approach to consumer problems was attempted through the logical development of science materials rather than by attacking consumer problems directly. It is believed by the investigators that this difference in approach to consumer problems and similar problems in science teaching is fundamental and one that needs considerable study.

7. The lack of uniformity in organization and content in individual courses seems to indicate that, in the main, principles of organization and criteria for the selection of the materials of instruction have not been formulated. For example, only three courses of study contained statements regarding curriculum principles related to the selection and organization of the materials to be included in the courses. In two of these courses there is no apparent evidence that such principles as were stated actually functioned. In the third there is some evidence to show that the principles stated were being employed in the organization and selection of content.

8. The master unit-topic chart does not reveal as clearly as is evident in the original courses of study the relative emphasis which is placed upon the abnormal functioning of the human body as contrasted with normal functioning. In the opinion of the investigators the great emphasis placed upon diseases and other abnormal functionings without emphasis on a thorough understanding of the normal functioning of the body is educationally unsound. Although emphasis is placed upon normal functioning, the courses of study give no assurance that such material is to be developed before attempting the development of materials associated with abnormal functioning.

9. An analysis of the methods of organizing the various units or topics found in the courses of study revealed quite clearly that some makers of courses of study are placing emphasis upon new ways of organizing materials. That this emphasis evidently has had little effect upon the content of the courses of study is shown by the fact that many courses employing radically different methods of organization contain approximately the same content.

New content is limited in most cases to the inclusion of descriptions

of the new discoveries in science. Examples of these new topics are: "Cosmic Rays," "Radio," "Vitamins," "Cathode Ray," "Electrical Radiations," and "Radio-Activity."

Occasionally there was found new content which tended to broaden the courses. The following topics illustrate this type of new content: "Intelligence," "Responses and Stimuli," "The Consumer," "Social Effects," "Cultural Development." This emphasis has not changed courses of study materially. It seems justifiable to suggest that greater benefit would accrue to pupils if less emphasis were placed on mechanics and more on new content and new ways of making the content function in their lives.

10. All but two of the courses of study seemed to have been worked out by deductive processes. Most of the subject matter suggested seemed to have been chosen and organized so that learning might proceed on a deductive basis. While many scholars would agree with this type of organization and selection of content, there is a large and growing group who would insist that learning in science as in other fields should progress through an accumulation of pertinent experiences which lead toward more general understandings. Although some of this latter group have not in the past been too meticulous with regard to the authenticity of subject matter employed, there are others who are just as vigorously insistent upon the scholarly use of material as those who advocate the deductive method of organizing materials.

CHAPTER IV

Analysis of Selected Courses of Study in Social Studies

THE Curriculum Laboratory has been collecting courses of study in the social studies, as in other fields, for the past fifteen years. The distribution by years and grades of the social studies courses is shown in Table XX by dates of publication and grade levels.

SOCIAL STUDIES COURSES AVAILABLE FOR THIS STUDY

If it can be assumed that the social studies courses received by the Curriculum Laboratory are indications of courses of study produced in this field in general, the following can be noted from the data in Table XX:

1. The cumulative effects of the old 8-4-year system can be noted in the number of courses published for the first eight grades prior to 1924 as against the number published for the last four grades. The introduction of the junior high school marked the end of the large differences in the number of courses produced for the eighth and ninth grades respectively.

2. The number of separate social studies courses¹ produced each year since 1923 has been fairly constant up to and including 1936. Three factors may account for the decrease in number of courses since that time:

- a) Many courses published during those years have not yet reached the Curriculum Laboratory.
- b) The Curriculum Laboratory has, since 1936, adopted the policy of restricting its requests to communities which past experience has shown to produce the most promising curriculum material.
- c) The large number of curriculum laboratories established in the last few years have all been requesting material.

¹ See Chapter II, "Techniques and Procedures," for methods by which courses were collected and evaluated, definitions, etc.

TABLE XX

Courses of Study in Social Studies Received by the Curriculum Laboratory, Teachers College, Columbia University, Distributed by Grade Levels and Dates of Publication

Date	K	1	2	3	4	5	GRADE				11	12	No		Sub.	TOTALS*	Grand Total
							6	7	8	9	10		Grade	Adult			
1923 and before	1	116	118	155	177	199	178	172	147	32	15	14	15	57	1,403	4,166	5,569
1924.	3	12	12	15	22	24	22	31	26	13	8	7	7	18	220	386	606
1925.	0	8	7	16	18	19	22	29	21	13	10	11	9	6	189	470	659
1926.	2	20	20	24	28	18	24	29	23	13	6	6	6	11	230	528	758
1927.	4	17	18	21	25	24	24	26	19	14	6	6	6	9	219	680	899
1928.	3	14	14	22	31	27	28	28	20	13	13	14	11	12	253	459	712
1929.	7	22	22	26	26	18	29	24	20	19	12	11	12	9	257	284	541
1930.	3	13	14	16	17	14	14	17	14	13	13	12	14	6	180	416	596
1931.	4	19	19	20	24	28	27	22	13	16	12	12	11	9	236	393	629
1932.	4	12	12	17	23	22	22	18	13	9	7	6	7	7	179	245	424
1933.	5	15	14	17	23	21	22	22	17	11	9	9	10	9	204	337	442
1934.	3	10	12	9	20	19	20	17	12	11	9	7	7	8	164	42	206
1935.	4	18	16	19	19	17	18	13	15	9	7	9	12	3	179	35	214
1936.	2	11	12	15	18	18	18	13	12	14	11	11	10	13	178	58	236
1937.	2	6	6	7	8	11	8	5	3	4	5	6	6	12	89	15	104
1938.	1	10	10	9	11	12	12	8	7	7	6	8	10	13	124	23	147
1939.	3	4	4	7	8	7	7	6	7	5	3	3	5	1	67	67	67
No date . . .	3	45	48	68	79	79	80	82	58	26	20	21	20	29	658	60	718
Total Subject Courses.	58	372	378	483	577	577	575	562	447	242	172	173	178	232	3	5,029	
Total General Courses.	55	575	587	796	952	1,056	1,055	1,056	970	363	287	307	285	41	8	8,393	
Total Both Groups.	113	947	965	1,279	1,529	1,633	1,630	1,618	1,417	605	459	480	463	273	11	13,422	

* As indicated in Chapter II a separate course is defined as a course containing only social studies or geography or history or any one of the social studies fields. A general course is defined as a course which may contain several or all of the subjects in the entire curriculum, of which social studies or geography or history is a part. Under both categories, separate courses and general courses, material for one grade in any field, such as social studies or geography or history, has been counted as a course.

3. There has been a steady and marked decrease in the number of social studies courses appearing in *general* courses in the last ten years. (In the main, the course of study material in the general courses is so inferior to material included in the separate courses that the general courses were not included for analysis in the present investigation.)

4. The average number of courses produced per grade varies markedly, from fifty-eight for the kindergarten to 577 for both grades 4 and 5. The number of courses produced per grade for the senior high school is only about one-third as great as the number produced for the intermediate grades. The number produced per grade for the primary grades and the junior high school is smaller than the number for the intermediate grades.

In order to distinguish further trends in course of study production in specific areas, such as geography, history, civics, and social studies,² all courses in social studies received up to and including January, 1938, were classified in these four areas. In this process all courses designated by those who prepared them as social studies, civics, geography, or history were classified in their respective areas. It should be remembered, however, that courses named "social studies" include many courses that at the lower grade levels are typical history, geography, or civics courses, and at the upper grade levels are typical sociology, economics, and commercial geography courses. The percentage of courses in each of these four minor divisions (as of January, 1938) is shown in Tables XXI and XXII, distributed according to dates of publication and grade levels respectively. Assuming again that the courses in the Curriculum Laboratory represent an adequate sampling of general production in these areas, the following additional trends appear to be evident from an analysis of the data in these tables.

RELATIVE PROPORTION OF CIVICS, GEOGRAPHY, HISTORY, AND SOCIAL STUDIES COURSES

1. Prior to 1924 only about one-eighth of all courses produced in the field of the social studies were designated as "social studies"

² A social studies course as used in the more inclusive sense usually contains a certain organization of social problems, such as transportation, communication, and recreation, which cuts across geography, history, civics, and the other social sciences, although some schools will label a geography course "social studies."

TABLE XXI

Courses of Study in Civics, Geography, History, and Social Studies Received by the Curriculum Laboratory, Teachers College, Columbia University, Distributed by Specific Subjects and Dates of Publication

Date	Civics	Geography	History	Social Studies
1923.....	17%	35%	30%	18%
1924.....	12	27	31	30
1925.....	15	34	18	33
1926.....	17	29	24	30
1927.....	12	27	23	38
1928.....	16	26	22	36
1929.....	2	27	21	50
1930.....	4	14	18	64
1931.....	9	21	14	56
1932.....	4	17	9	70
1933.....	9	17	14	60
1934.....	0	12	10	78
1935.....	3	6	7	84
1936.....	1	6	18	75
1937.....	0	21	2	77
No date.....	17	34	25	24
% of Total.....	12%	26%	22%	39%

courses. Since that time there has been a gradual increase from year to year in the number of courses designated as "social studies" and a correspondingly gradual decrease in the relative number of courses designated as civics, geography, history, etc.

2. In 1936, 75 per cent of all the separate courses of study received were social studies courses as compared to the 18 per cent of those received prior to 1924. This increase is probably due to two factors: (a) The actual increase in the number of communities offering social studies in lieu of geography, history, and civics; (b) the fact that communities working with the social studies as a comparatively new field felt a greater need for the guidance that comes from courses of study than do communities working with the old separate areas of history, geography, and civics, and hence prepared more courses of study.

Probably the most interesting conclusion to be drawn from Table XXII is that a relatively large percentage of social studies courses

occurs in the kindergarten, 56 per cent; and in grade 9, 61 per cent; grade 10, 58 per cent; grade 11, 62 per cent; and grade 12, 60 per cent. The large percentage of social studies courses in the kindergarten would probably be expected. In grades 9, 10, 11, and 12, the preponderance of social studies courses (which included courses labeled

TABLE XXII

Courses of Study in Civics, Geography, History, and Social Studies Received by the Curriculum Laboratory, Teachers College, Columbia University, Distributed by Specific Subjects and Grade Levels

Grade	Civics	Geography	History	Social Studies
K.....	20%	13%	11%	56%
1	14	22	23	41
2.....	13	23	22	42
3.....	12	30	21	37
4.....	10	37	21	32
5	11	36	24	29
6	11	37	24	28
7.....	12	31	24	33
8.....	14	20	27	39
9.....	11	13	15	61
10.....	10	10	22	58
11.....	8	9	21	62
12.....	10	11	19	60
No grade	24	23	23	30
% of Total .. .	12%	26%	22%	39%

social studies, economics, modern problems, sociology, problems in American democracy, and the like) is probably due to the fact that teachers feel a greater need for preparing courses in social studies fields than in such longer established subjects as civics, geography, and history. It will be noted that in grades 1 to 8 the percentage of geography and history courses approximates the percentage of social studies courses, and in grades 4, 5, and 6 the percentage of geography courses is actually higher than the percentage of social studies courses. This would seem to indicate that geography and, to a somewhat lesser extent, history are holding their own when they are compared with the social studies in point of number of courses of study which are produced.

**EVALUATION OF SOCIAL STUDIES COURSES
OF STUDY**

One of the services of the Curriculum Laboratory for the past fifteen years has been the evaluation of all courses received. The courses with the highest rating have been included in a "List of Judged Outstanding Courses of Study," a mimeographed bulletin issued periodically by the Laboratory.³ Until 1935 these courses were evaluated on the basis of criteria developed by Stratemeyer and Bruner.⁴ Because of the changing trends in education and the improvement in courses of study, it was found necessary to revise these criteria.⁵ The revised criteria have been used not only as a basis for judging the 1936 and 1937 courses but also for rejudging all the courses which were designated "Judged Outstanding" on the basis of the Stratemeyer-Bruner criteria.

The number of courses that have been designated "Judged Outstanding" at one time or another since 1923 is shown in Table XXIII on page 118. An analysis of the data in this table shows that during this period slightly over one-fourth of all the social studies courses received in the Curriculum Laboratory have been designated "Judged Outstanding." The number and percentage of such courses have varied considerably from year to year, but a significantly greater number have been judged outstanding since 1931 than before. Owing to the fact that since 1936 the Curriculum Laboratory has asked for materials only from communities which in the past had produced the better courses of study, it is natural that the percentage of courses judged outstanding would be greater in these later years. Of all the 625 civics courses of study received up to January, 1938, 22 per cent were judged outstanding; of the 1,381 geography courses, 19 per cent were judged outstanding; of the 1,143 history courses, 16 per cent were judged outstanding; and of the 2,012 social studies courses, 28 per cent were judged outstanding. This would seem to indicate that more

³ Since 1936 the list of courses judged outstanding have appeared annually in the *Curriculum Journal*.

⁴ See Stratemeyer, Florence B. and Bruner, Herbert B. *Rating Elementary School Courses of Study*. New York: Bureau of Publications, Teachers College, Columbia University, 1926.

⁵ Bruner, Herbert B. "Criteria for Evaluating Course of Study Materials." *Teachers College Record*, 39:1-7-120, November, 1937. See Appendix.

TABLE XXIII

*Courses of Study in Social Studies Received by the Curriculum Laboratory,
Teachers College, Columbia University, Distributed by Dates of
Publication and Number Judged Outstanding*

Date	Number of Courses	Number of Courses Judged Outstanding	Per Cent of Courses Judged Outstanding
1923 and before.....	1,403	164	11.7%
1924.....	220	42	19.1
1925.....	189	34	18.0
1926.....	230	88	38.3
1927.....	219	56	25.6
1928.....	253	56	22.1
1929.....	257	85	33.1
1930.....	180	51	28.3
1931.....	236	113	47.9
1932.....	179	103	57.5
1933.....	204	75	36.8
1934.....	164	59	36.0
1935.....	179	78	43.6
1936.....	178	104	58.4
1937.....	89	62	69.7
1938.....	124	61	49.2
1939.....	67	43	64.2
No date	658	39	5.9
Total.....	5,029	1,313	26.1%

of the courses labeled social studies are judged outstanding than are courses in civics, geography, and history. The reason may be that many of the courses, particularly in history and civics, tend to be merely subject matter courses and to contain little else than logical arrangement of such subject matter.

SELECTION OF SOCIAL STUDIES COURSES FOR DETAILED ANALYSIS

In selecting from the available courses the ones which were to be analyzed in detail, the following criteria were utilized:

1. Only those courses published between January 1, 1930, and March 31, 1938, were included. An examination of the social studies

courses published between March 1, 1938, and the time of final publication indicates that the results would probably have been little changed had these courses been included.

2. Only courses for grades 4 to 12 were used.

3. Preference was given to the courses that rated highest on the revised criteria.⁶

4. In order to give adequate scope and balance to the investigation, care was taken to include a proportionate number of state and city courses, a proportionate number of courses coming from rural and urban sections, and a proportionate number from most of the different geographical sections of the country.

Two hundred seventy-seven social studies courses of study from seventy-one different communities were finally selected for analysis. Approximately the same number of courses were included at each grade level, and the majority of the courses were on the "List of Judged Outstanding Courses of Study." In this respect the procedure in the field of social studies differs from that followed in the fields of science and industrial arts. Although judged outstanding courses were utilized in the latter investigations, a sufficient number of courses representing median practice in the schools were added to guarantee that the list of courses should represent a typical cross section of courses of study in these areas. The results presented in this chapter, on the contrary, are derived chiefly from a study of practices as indicated by the judged outstanding social studies courses from various sections of the country.

TECHNIQUES USED IN THE ANALYSIS OF SOCIAL STUDIES COURSES

The first step in the analysis of the content of social studies courses of study was the preparation of a typed outline for each course, prepared according to the following procedure:

1. A subject matter specialist studied each course to determine the actual content or subject matter and marked it for a typist, supplying symbols such as I, A, 1, a, (1), (a) where necessary, indicating the time devoted to each unit where given, and preparing pertinent comments where needed.

2. A member of the immediate project staff then checked the

⁶Bruner, *op. cit.*

specialist's work to ensure as much uniformity as possible among the subject matter fields, both in mechanical details and in the type of material selected as representative of content.

3. An outline of the content was then typed according to the specialist's instructions.

4. The typed outline was then rechecked with the course of study in accordance with the instructions provided by the subject matter specialist.

The majority of the courses contained a very definite outline of content. Others, however, had to be outlined according to the procedures which are described above and discussed in more detail in Chapter II.

As a second step in the analysis, unit-topic charts were prepared to show the content of all the courses in the social studies field from grade 4 to grade 9 inclusive; also at a senior high school level in American history, in world history, and in modern problems (which included civics, government, economics, and sociology). In constructing these charts, the names of the courses were listed across the top of the chart and the various units or topics along the left-hand side. (See Table X, Chapter II.) In listing the courses across the top, all the social studies courses for a given community for a given grade were combined; that is, if a community taught both history and geography in one grade rather than social studies, these two courses were combined and treated as one. At the junior high school level, civics courses were combined with other social studies courses. The relative amount of emphasis given to geography, history, civics, and other areas of the social studies, however, was shown on each chart, and the charts were so constructed that a comparison could easily be made between the various types of social studies materials.

The symbols used in designating major topics and subtopics and the form used for the index of significance are discussed in Chapter II.

The third step was the development of a master unit-topic chart which was constructed from the individual unit-topic charts by combining the totals of the various charts to show the relationships existing between and among the different grades. The master unit-topic chart also shows which units and topics are to be found in one or more than one grade. For illustration of this master unit-topic chart, see page 122.

**CONTENT OF SOCIAL STUDIES COURSES AS
SHOWN BY MASTER UNIT-TOPIC CHART**

The social studies courses charted included American history, civics, economics, geography, modern problems, social studies, sociology, and world history. Many of the courses of study designated "social studies" differed little if at all from similar courses designated civics, geography, or world history. Because of this lack of uniformity in labeling, it was decided to construct the social studies charts in such a way that similar items of content would be grouped together regardless of whether they were found in courses labeled social studies for fifth grade or world history for senior high school. In order to effect a working organization for the charted content, the following main headings were set up and specific items were placed in the classification in which they most often appeared: American History Topics, Geography Topics, Government Topics, Social Problems Topics, State History Courses, United States Geography Topics, World Geography Topics, and World History Topics. Such topics as "Communication," "Conservation," and "Transportation," were placed as heads under Social Problems Topics. Such topics as "Early Mediterranean Civilizations" were charted under World History Topics, even though the units came from geography courses, social studies, or world history. Similarly, the unit "European Background" was charted under American History Topics because in most courses of study this unit deals with the discovery of America.

World History

In charting the content of courses of study, it seemed desirable to use some logical pattern which conformed as closely as possible to the organization used in the majority of courses of study. For example, under World History Topics typical major classification headings are "Early Medieval Civilizations," "Period of Industrial Revolution," and "The Middle Ages." Subdivisions were set up under some of these major classifications. On the following pages is an illustration of the mechanical setup of the units and topics on the charts. This illustration is taken from the master unit-topic chart for social studies. (See Table XXIV.)

An examination of the data thus collected shows that of the major

TABLE XXIV
Section of Master Unit-Topic Chart

Major Topic	4	5	6	7	8	9	World History	American History	Modern Problems	Totals
World History Topics (except U. S.).....	10:2365 <u>40</u>	11:1256 <u>41</u>	25:3643 <u>39</u>	11:1772 <u>31</u>	3:156 <u>31</u>		23:18283 <u>23</u>			83:27475 <u>277</u>
Early Medieval Civilizations.....	9:1658 <u>40</u>	4:575 <u>41</u>	18:1670 <u>39</u>	6:394 <u>31</u>	3:82 <u>31</u>		18:3670 <u>23</u>			58:8049 <u>277</u>
Middle Ages.....	3:314 <u>40</u>	9:603 <u>41</u>	18:950 <u>39</u>	4:133 <u>31</u>	3:53 <u>31</u>		19:2987 <u>23</u>			56:5040 <u>277</u>
Crusades.....	2:46 <u>40</u>	1:29 <u>41</u>	5:49 <u>39</u>	4:56 <u>31</u>	2:11 <u>31</u>		11:81 <u>23</u>			25:272 <u>277</u>
Feudalism.....	2:99 <u>40</u>	3:199 <u>41</u>	4:145 <u>39</u>	2:37 <u>31</u>	2:16 <u>31</u>					13:496 <u>277</u>
Renaissance.....	2:23 <u>40</u>	3:67 <u>41</u>	7:242 <u>39</u>	2:30 <u>31</u>	3:19 <u>31</u>		17:1317 <u>23</u>			34:1698 <u>277</u>
Period of Industrial Revolution.....			3:198 <u>39</u>				20:528 <u>23</u>			29:1710 <u>277</u>

TABLE XXIV (Continued)

	4	5	6	7	8	9	World History	American History	Modern Problems	Totals
American History Topics.....	13:1742 <u>40</u>	30:4793 <u>41</u>	19:2894 <u>39</u>	25:7620 <u>31</u>	27:7372 <u>31</u>			14:7876 <u>14</u>		128:32297 <u>277</u>
Period of Discovery and Exploration...	11:525 <u>40</u>	19:793 <u>41</u>	12:482 <u>39</u>	14:635 <u>31</u>	7:162 <u>31</u>			12:233 <u>14</u>		75:2830 <u>277</u>
Spanish.....	6:100 <u>40</u>	12:213 <u>41</u>	6:134 <u>39</u>	2:24 <u>31</u>	2:24 <u>31</u>			10:106 <u>14</u>		38:495 <u>277</u>
French.....	3:19 <u>40</u>	11:137 <u>41</u>	6:87 <u>39</u>	2:28 <u>31</u>	2:17 <u>31</u>			9:64 <u>14</u>		33:352 <u>277</u>
English.....	3:43 <u>40</u>	11:127 <u>41</u>	4:37 <u>39</u>	1:11 <u>31</u>	2:15 <u>31</u>			9:65 <u>14</u>		21:233 <u>277</u>
Period of Civil War and Reconstruction		9:348 <u>41</u>	4:219 <u>39</u>	9:480 <u>31</u>	20:822 <u>31</u>			14:1310 <u>14</u>		56:3179 <u>277</u>
The Civil War.....		3:102 <u>41</u>	3:70 <u>39</u>	6:91 <u>31</u>	12:297 <u>31</u>			13:224 <u>14</u>		37:784 <u>277</u>

classifications appearing under the World History Topics, "Early Medieval Civilizations" received the most extensive treatment, having an index of significance of 58:8049/277.⁷ This high figure might be explained by the fact that the period covers a great span of time and nine civilizations are treated, or by the fact that extensive treatment is given to "The Greeks," with an index of 43:2276/277, and "The Romans," with an index of 42:2154/277. The combined frequency of these two units represents a little over half the entire section. It would seem that Greek and Roman history are considered to be the most important World History Topics, for they are treated much more extensively than any of the other topics in this section.

In contrast to the thorough treatment of "Early Medieval Civilizations," which has an index of 58:8049/277, it should be noted that "Early Oriental Civilizations" has an index of only 4:168/277, even though the subdivisions of this unit include, "China," "Japan," and "India." This topic is studied only in World History (senior high school), in contrast to "Early Medieval Civilizations," which is given extensive treatment from grades 4 to 8 inclusive. In contrast to "Early Oriental Civilizations," the topic "Modern Asia" has an index of 19:828/277, "China" having an index of 15:275/277 and "Japan" an index of 13:480/277.

The "Period of Industrial Revolution" seems to be greatly emphasized in senior high school World History, having an index of 29:1710/277.

Another important major classification in the World History Topics is "The Middle Ages," which has an index of significance of 56:5040/277. Its importance can be explained by the fact that under it are included "The Crusades," "Feudalism," and "The Renaissance." The significant treatment given "The Renaissance" (34:1698/277) is not surprising in view of the fact that many historians believe that this period is richest of all in contributions to present-day life. The fact that the topic "The Middle Ages" is studied in grade 6 (index of 18:950/39) indicates the emphasis given it in the intermediate grades.

American History

A noticeable trend in American History Topics is that such periods

⁷ This set of figures, called an index of significance in this report, is to be read as follows: 58 courses out of the 277 courses examined in the field of social studies treated "Early Mediterranean Civilizations," devoting to it 8,049 items.

as *Colonization, Discovery and Exploration, Industrial Expansion, and Westward Expansion* receive almost equal treatment in courses of study. The historical periods up through the *Civil War* are treated more consistently, in point of frequency of mention, than the periods following the conflict. American history in the intermediate grades is primarily concerned with the period from *European Background* through the period of the *Westward Movement*. The fifth grade gives a more extensive treatment to American History Topics than is given in grades 4 and 6. "Colonial Life" is a popular unit in the intermediate grades, having a total index of significance of 38:1495/277.

American history is studied extensively in the first two years of junior high school, but no American History Topics other than those included in the section covered by Government Topics were found for the ninth grade. One reason for the emphasis on American history units and topics in grades 7 and 8 is the practice of including courses in American history in the last two years of eight-year elementary schools. In the past, the assumption was that many children would not continue their education beyond the elementary school. Civics and social problems courses are traditionally included at the ninth grade level. The items pertaining to American history at this level are, in the main, treated in relation to government and civics; hence in this study they were charted as such rather than as American History Topics.

The pattern of American History Topics as set up on the unit-topic chart is the pattern that American history courses of study generally follow. Virtually all the American history courses of study analyzed are organized chronologically. Subheadings in this division that receive significant treatment are shown in Table XXIV. It is noticeable that a much more thorough treatment is given American History Topics in the senior high school than is accorded to them in the intermediate grades.

Geography

The charts show that grades 4 and 6 give greater emphasis to world geography than is given in grade 5, where United States geography is emphasized. This might be explained by the tendency to include an extensive study of American history in the fifth grade. Under World Geography Topics the continent studied mainly is *Europe*, which has an index of significance of 65:14564/277. The detail with which Europe

seems to be studied is indicated by the unusually high number of items—14,564—which is almost 50 per cent of the total number of items—31,030—for the whole classification, World Geography Topics. In view of the present world situation it is highly probable that less proportionate attention should be given Europe in the future and more to South and Central America. The usual practice in the fourth grade seems to be to include a detailed study of several contrasting types of civilizations in terms of climate, occupations, trades, etc. The countries most often contrasted are *Switzerland*, with an index of 28:1201/40; *Holland*, with 25:741/40; *Southern Africa* and the *Congo Region*, with 24:649/40; and *Norway* and *Sweden*, with 22:678/40. Of these countries only *Switzerland* is given much attention in another intermediate grade, appearing in grade 6 with an index of 11:366/39. *North America* (not including the United States) is given greater emphasis in grade 5, having an index of 23:2508/41. This emphasis can be explained by the fact that in the intermediate grades American history is studied most intensively in the fifth grade, and in some schools is correlated with geography.

It is found that, in the courses analyzed, United States Geography Topics are treated extensively in grades 4 to 7 and not at all above the eighth grade. The greatest emphasis is given this division in grade 5, where it has an index of 25:7019/41. It is generally treated in terms of geographical divisions of the United States, such as *Middle Atlantic States*, *Southern Central States*, and *Western States*. The *possessions* of the United States are treated rather extensively, having an index of 30:2156/277.

Government

The most extensive treatment of Government Topics is in "Modern Problems," with an index of 36:5220/43. The courses in grades 8 and 9 give Government Topics indexes of 18:2826/31 and 12:2477/15 respectively. As charted, Government Topics for the most part refer to government organization and its subdivisions—federal, state, and local. Topics given considerable emphasis in this section, together with their indexes of significance, follow: "Federal Government" (41:2637/277), "State Government" (38:2128/277), "Local Government" (38:1727/277), "Finance (Taxes)" (38:1285/277). "Civil Service" has an index of only 3:26/277. It is interesting to note that "Democracy" has an index of 15:209/277, but "Dictatorships" has an

TABLE XXV
Significant Social Problems Treated in Social Studies Courses

	4	5	6	GRADE	7	8	9	World History	American History	Modern Problems	Totals
Transportation and Communication	8:532 40	15:1692 41	13:1258 39	8:661 31	15:903 31	7:370* 15	1:9 14	22:601 43	89:6026 277		
Transportation.....	8:361 40	15:1088 41	10:633 39	8:521 31	15:696* 31			12:222 43	68:3521 277		
Communication.....	6:171 40	12:604 41	13:625 39	7:140 31	12:207 31			7:141 43	57:1888 277		
Education*.....	5:196 40	6:126 41	4:77 39	6:155 31	18:546 31	10:299* 15		25:483 43	74:1882 277		
International and Peace Relations*.....		3:27 41	6:199 39	3:110 31	1:58 31	6:390* 15	13:409* 14	24:769* 43	56:1962 277		
Conservation of Natural Resources	4:79 40	7:144 41	7:262 39	5:73 31	6:47 31	8:248* 15		18:331* 43	55:1184 277		
Industries*.....	5:341 40	13:1681 41	10:698 39	8:1088* 31	15:873 31				51:4681 277		
Race and Population Problems*.....			3:111 39	3:133 31	9:211 31	6:251 15	4:46 14	18:769 43	43:1521 277		
Health.....	4:64 40	3:96 41	4:120 39	2:44 31	9:201 31	9:389* 15		11:276* 43	42:1170 277		
Labor and Capital*.....		1:6 41			12:227 31	6:439* 15		21:695 43	40:1367 277		

* Subdivisions given on master unit-topic chart but omitted in this illustration.
Note: These topics and figures were taken from the master unit-topic chart in social studies.

index of only 4:41/277. Under "Dictatorships" are the subdivisions *Fascism* and *Communism*, having indexes of 1:12/277 and 1:11/277 respectively.

State History and Geography

State History and Geography Topics have a total index of 43:4173/277. This relatively large frequency can be explained by the fact that a number of states require the teaching of state history and geography. In grade 7 these topics total 11:1034/31 and in grade 5, 12:600/41. They occur in the same number of courses in grade 4, which has an index of 12:283/40, as in grade 5; but the low frequency of items indicates that the study is not very detailed on either level.

Social Problems

While only a few schools have gone so far as to organize their whole program around persistent social problems, many schools are beginning to study these problems intensively in the final year of high school in courses called "Modern Problems," "Problems of American Democracy," "Economics," "Sociology," etc. Perhaps because of the junior high school organization, Social Problems Topics are also widely studied in grades 7, 8, and 9, with a special emphasis in grade 9. Social Problems Topics have a total index of significance of 196:40999/277.

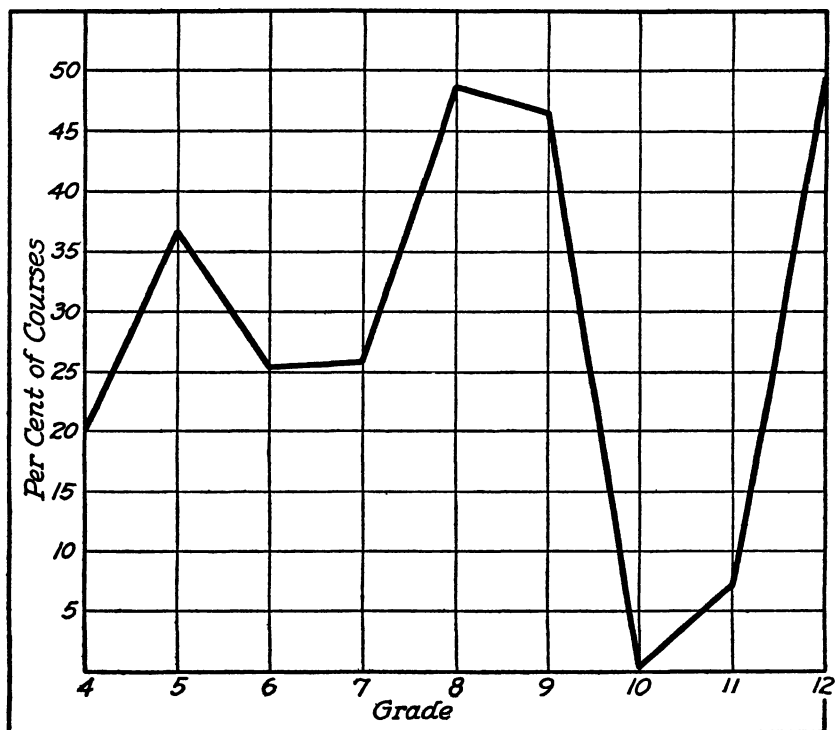
Communication and Transportation

As might be expected, the topics "Communication" and "Transportation" rank first in the Social Problems Topics classification, having an index of 89:6026/277. It was necessary to chart these two topics together because many course of study writers make them a combined unit. However, as nearly as could be determined from a separate treatment of the two topics, "Transportation" has an index of 85:4095/277 and "Communication," 74:2379/277. From Table XXV, page 127, it appears that "Transportation" and "Communication" are given the greatest emphasis, by percentage of courses examined, in modern problems courses for the senior high school, and in grade 8; but that from grades 4 to 6 inclusive they are extremely popular as units of work.

In view of the fact that *transportation* is studied extensively from grades 4 to 12, it is interesting to note the phases of this subject em-

GRAPH I

Per Cent of Social Studies Courses Treating Transportation



phasized on the intermediate, junior high school, and senior high school levels. Graph I shows the per cent of social studies courses treating transportation. In the intermediate grades transportation is treated from the standpoint of the early history of transportation, the development of wheels and roads, and the effect of transportation upon the development of civilization, with special stress on its effect on the development and settlement of the United States. On the junior high school level, the subject is handled in much the same way as in the intermediate grades. Instead of being treated from the standpoint of its relation to the United States, however, it is considered rather as a world factor, covering trade routes, navigable rivers of the world, railroads in foreign countries, etc. Large sections are given over to the study of air transportation. Problems connected with traffic regulations are also taken up at this level. Courses on the senior high school level (modern problems, for the most part) treat the three phases of transportation—air, land, and water—not so much as a historical study but as a study of the problems they present and the bearing of these problems upon the community and nation as a whole.

This emphasis on transportation throughout the entire school program can be explained in several ways. Transportation is a topic which lends itself to study on many grade levels, and no matter how small or how large the community, there are facilities available for study. Furthermore, it is the kind of topic which can be treated in the very conservative curriculum as well as in the most progressive school organization. Since it does not necessarily involve controversial issues, teachers do not hesitate to include the topic. Another reason for the emphasis may be the fact that there is available abundant material on this topic, which makes it comparatively easy to set up a unit around it.

The same generalizations apply to the topic of *communication*. It is taught throughout the same grades, and it is often a part of the same unit as transportation or so arranged that the unit on communication follows or precedes the unit on transportation.

"Education," which has a total index of significance of 74:1882/277, ranks second (with "Communication") in the list of Social Problems Topics. (See Table XXVI, page 131.) Education is given rather extensive treatment as a topic on all grade levels, except in senior high school world history and American history courses. The greatest emphasis on this topic is in grades 8 and 9 and in senior high school mod-

TABLE XXVI

Social Studies Courses, Grades 4-12, Treating Social Problems Topics*

Topic	Rank	Treatment	Topic	Rank	Treatment
Transportation . . .	1	85:4095/277	Consumption	15	32:861/277
Communication . . .	2.5	74:2379/277	Money, Credit, and Exchange . . .	16.5	31:1650/277
Education	2.5	74:1882/277	Trade and Commerce	16.5	31:1150/277
International and Peace Relations .	4	56:1962/277	Care of Dependents.	18	29:1155/277
Conservation of Natural Resources	5	55:1184/277	Agriculture (Industry) . . .	20	28:1191/277
Industries	6	51:4681/277	Arts and Culture . .	20	28:941/277
Race and Population Problems .	7	43:1521/277	Recreation	20	28:619/277
Health	8	42:1170/277	Crime	22	26:249/277
Immigration	9	41:979/277			
Labor and Capital	10	40:1367/277	Agriculture (Rural Problems)	23	25:872/277
Production	11	39:1410/277	Leisure Time, Use of	24	24:641/277
Religion and the Church .	12	38:615/277	Business and Industry	26	20:594/277
Family	13	36:827/277	Labor Problems .	26	20:467/277
Distribution	14	33:1005/277	Banking	26	20:454/277

* Only those topics treated in twenty or more courses are listed here.

ern problems courses. Sub-items cover topics such as *aims*, *cost*, *history*, *organization*, and *trends* of education.

International and Peace Relations

The topic "International and Peace Relations" is fourth on the list, having an index of 56:1962/277. Every American history course ex-

amined, with the exception of one, deals with this topic, which has an index of 13:409/14 in the American history courses examined. It is noticeable that this topic is almost ignored below grade 9, which possibly indicates that educators feel that *international and peace relations* is too difficult a subject to discuss in the lower grades.

Conservation

In recent years *conservation of natural resources* has become an important problem in the minds of the American people, largely because of governmental activities such as the AAA, CCC, and TVA. It is encouraging to find this interest reflected in courses of study. "Conservation of Natural Resources" ranks fifth in the Social Problems Topics, having an index of 55:1184/277. By percentage of courses per grade, it is studied most in the ninth grade, where it has an index of 8:248/15, representing approximately 50 per cent of the courses examined in that grade. This might be explained by the fact that social studies courses at this grade level are generally community civics. The placement of this topic ranges through grades 4 to 12, which seems to indicate that it is a suitable topic at almost any grade level. It would seem that it is the kind of topic that could well be given more emphasis in the intermediate grades than it is receiving at the present time. In Table XXVII the frequency of mention of Social Problems Topics in Social Studies courses is presented.

Social Problems

There are some important Social Problems Topics which receive far less attention than would and should be expected. For example, "Housing" has an index of significance of only 18:693/277, while "Transportation" has an index of 85:4095/277. "Propaganda" as a unit is included in only two courses of study, with a frequency of 34. It should be noted, however, that "Public Opinion" has an index of 15:607/277. These no doubt are related topics.

There is only one unit on *consumer education* as such, with 71 items; but the topic of "Consumption" has a relatively high index, 32:861/277. Other units which receive surprisingly little treatment are "Advertising" (3:28/277), "City Planning" (2:28/277), "Social Security" (7:173/277), and "Youth" (4:34/277).

Geography Topics and History Topics seem to deal with a fairly uniform body of content. Social Problems Topics, however, tend to scat-

TABLE XXVII

*Social Problems Topics as Treated in Social Studies Courses, Grades 4-12**
Arranged According to Frequency of Mention

Topic	Rank	Treatment	Topic	Rank	Treatment
Industries.....	1	51:4681/277	Trade and Commerce	14	31:1150/277
Transportation.....	2	85:4095/277	Distribution.....	15	33:1005/277
Communication....	3	74:2379/277	Immigration.....	16	41:979/277
International and Peace Relations .	4	56:1962/277	Arts and Culture ..	17	28:941/277
Education.....	5	74:1882/277	Agriculture (Rural Problems)	18	25:872/277
Money, Credit, and Exchange... ..	6	31:1650/277	Consumption.....	19	32:861/277
Race and Population Problems	7	43:1521/277	Family . . .	20	36:827/277
Production.....	8	39:1410/277	Leisure Time, Use of	21	24:641/277
Labor and Capital .	9	40:1367/277	Recreation ..	22	28:619/277
Agriculture (Industry)... ..	10	28:1191/277	Religion and the Church	23	38:615/277
Conservation of Natural Resources	11	55:1184/277	Business and Industry... ..	24	20:594/277
Health.....	12	42:1170/277	Labor Problems	25	20:467/277
Care of Dependents.	13	29:1155/277	Banking	26	20:454/277
			Crime	27	26:249/277

* Only those topics treated in 20 or more courses are listed here

ter over a wide range with only a relatively few topics common to any considerable number of courses of study. It is significant that only twenty-seven Social Problems Topics were found which appeared in twenty or more of the 277 courses examined. (See Table XXVI, page 131.)

CONTENT OF SOCIAL STUDIES COURSES BY GRADE LEVELS

In this section a summary is made of topic divisions by grade levels in the area of social studies.⁸ (For an example of a unit-topic chart for a single grade, see Table XXVIII.

Grade 4

In the fourth grade greatest emphasis is given to the study of World Geography Topics, which has an index of 36:8461/40. The unit most frequently studied is "Europe," with an index of 31:3124/40. Twenty-eight of the forty courses include a study of "Switzerland," with a frequency of 1,201 items. "Holland" has an index of 25:741/40. "Norway" and "Sweden" are studied almost as frequently, having an index of 22:678/40. It seems to be the practice to study a low wet country,

TABLE XXVIII

*Indexes of Significance of Units and Major Topics Found in Fourth Grade Social Studies Courses**

Units or Major Topics	Indexes of Significance	Units or Major Topics	Indexes of Significance
World Geography, except United States ..	36:8461/40	Holland .	25:741/40
Introduction	9.225/40	Italy	2:92/40
Europe:.	31:3124/40	Norway and Sweden ..	22 678/40
Finland	2:147/40	Spain	1:25/40
France	5 294/40	Switzerland	28:1201/40
Germany.....	2:26/40	Mediterranean Countries .	12:218/40
Great Britain.....	2:15/40		

* This illustration gives only a small section of the complete list of units and major topics found in fourth grade social studies courses

⁸ As explained on page 8, social studies courses charted included geography, world history, etc.

generally Holland, and a contrasting high country, most often Switzerland. A study of the *polar regions* is also very popular in the fourth grade, with an index of 26:989/40.

In studying *Africa* the most common unit is the *Congo*, with an index of 24:649/40. Other units frequently deal with *Egypt* or the *Sahara Desert*, with indexes of 10:472/40 and 9:158/40 respectively.

Of the South American countries, *Brazil* is the most frequently studied; it has an index of 9:429/40 against an index of 10:497/40 for all of South America.

It appears that United States Geography Topics, having a total index of only 8:1552/40, are not generally taught in the fourth grade. As a rule the topics listed are treated in only one or two courses of study.

One-fourth of the courses of study in grade 4 include items that have been classified under the heading of World History Topics. In these courses most of the emphasis is placed on *Early Medieval Civilization*, which has an index of 9:1658/40; almost equal attention is given to the subdivisions *Egyptian*, *Phoenician*, *Greek*, and *Roman* civilizations. Very few of the courses at this grade level deal with early European civilizations, and none of the courses includes a study of current world history.

Since most of the social studies program in the primary grades tends to be organized around Social Problems Topics which come within the immediate experience of the children, it is not surprising to discover that this trend is continued in the fourth grade. Problems most frequently studied in this grade are "Transportation" (8:351/40), "Communication" (6:171/40), "Housing" (6:102/40), and "Clothing" (5:435/40).

Twelve courses of the forty examined include a study of State History and Geography Topics. Six of these twelve courses were from one state, California.

Grade 5

Courses are more fully developed in the fifth grade than in the fourth, as indicated by the number of items in indexes of significance. Courses at this grade level include extensive units which fall under the classifications Social Problems Topics and American History Topics. Units in both of these classifications appear in three-fourths of the courses examined for grade 5.

The most popular Social Problems Topics are "Transportation" and "Communication," with indexes of 15:1088/41 and 12:604/41. Other important topics on the list are "Conservation" (7:144/41), "Lumbering" (6:360/41), "Education" (6:126/41), and "Agriculture" (5:185/41). Only two courses of the forty-one analyzed in this grade mentioned *housing*.

Much more importance is given to American History Topics in the fifth grade (a total index of 30:4793/41) than in the fourth grade (a total index of 13:1742/41). Most of the emphasis given to American history at the fifth grade level falls between the *Period of Discovery and Exploration* and the *Period of Westward Expansion*. Few fifth grade American history courses deal with the period since 1880. Most weight is given to the periods of exploration and discovery by the *Spanish*, which has an index of 12:213/41. *French* with an index of 11:137/41, *English* with 11:127/41, and *Causes of the Revolutionary War* with 8:150/41, and *The War* itself with 5:103/41 are given most emphasis in the study of the "Period of the American Revolution."

World Geography Topics are included in almost two-thirds of the fifth grade courses of study. In contrast to world geography in the fourth grade where type civilizations are studied, fifth grade geography covers more fully the countries of a single continent. For example, a number of schools study at the same time *China*, *Japan*, and *India* (indexes of 5:181/41, 5:155/41, and 5:97/41 respectively), not only because they are related civilizations but also because they are on the same continent.

The greatest emphasis in the World Geography Topics divisions is given to "Canada and Her Northeastern Neighbors," which has an index of 21:1270/41. Considerable emphasis is also given "Central America" and "Mexico," with indexes of 12:186/41 and 12:565/41. South America is treated in nine courses out of 41 and has a frequency of 804.

It is interesting to note that twenty-five of the forty-one courses examined in the fifth grade treat United States Geography Topics as against eight courses out of forty in the fourth grade. As a rule, the various regions of the United States are studied, with major attention given to the *North Central States* (index 17:859/41) and the *Southern States* (index 17:959/41), and with least attention to the *Pacific States* (index 5:395/41). A rather thorough study of *Possessions of the United States* is included in the United States Geography Topics.

Grade 6

On the sixth grade level World Geography Topics receive by far the most attention (total index 30:15517/39). *Europe* is studied most thoroughly of any of the continents at this grade level (index 25:10594/39). Strange as it may seem, *Russia* is the country having the highest index (20:1291/39). Other nations given a good deal of attention are *France*, *Germany*, *Great Britain*, *Italy*, the *Netherlands*, *Norway*, and *Sweden*. About one-third of the courses have units on *China* and *Japan*, which have indexes of 13:773/39 and 14:819/39 respectively. A significant number of schools study *Australia* (index 11:801/39). Almost an equal number of schools study *South America* in the sixth grade (9:754/39) and in the fifth grade (9:804/41).

There is a great increase in World History Topics in the sixth grade (total index 25:3643/39), as compared with grade 4 (10:2365/40), and grade 5 (11:1256/41). The two periods most emphasized are *Early Medieval Civilizations*, which has an index of 18:1670/39, and *The Middle Ages*, 18:950/39. The *Greeks* and the *Romans* rank high in importance, having indexes of 12:531/39 and 11:546/39 respectively. Under the headings of "The Middle Ages" the significant subtopics are *Crusades*, *Feudalism*, and *Renaissance*.

Social Problems Topics are treated in 50 per cent of the sixth grade courses. As in grades 4 and 5, the topics most frequently mentioned are "Communication" (13:625/39) and "Transportation" (10:633/39). It is worth noting that *International Relations* is treated in four courses, with a frequency of 102. An increasing number of courses begin to deal with the "Conservation of Natural Resources" in the sixth grade (index 7:262/39). The important topic of "Housing" is barely mentioned (index 2:63/39).

There is a noticeable decline in the number of courses treating American History Topics in this grade, the total index being 19:2894/39. The majority of these courses begin with "The Period of Discovery and Exploration," which has an index of 12:482/39, but only six courses treat the World War. This probably indicates that early American history rather than more recent history is emphasized in grade 6.

Grade 7

Great importance is given to American History Topics in Grade 7, the total index being 25:7620/31. Though an increasingly large number

of courses treat "American Life since 1880," almost equal emphasis is given to the Civil War and the American Revolution. Only two courses of thirty-one examined have special sections on the Bill of Rights, and only eight discuss the American Constitution.

Twenty-three of the thirty-one courses contain units which fall under the division Social Problems Topics, the total index being 23:3848/31. While this number is high, there seems to be no agreement as to the kinds of problems which should be included in a seventh grade course of study in social studies. High ranking topics, together with their indexes, are as follows: "Transportation" (8:521/31), "Communication" (7:140/31), "Manufacturing" (6:176/31), "Community Life" (5:478/31), "Agriculture" (4:349/31), and "Standards of Living" (4:162/31). Some significance may be attached to the fact that units are included on *cooperatives, crime, national income, propaganda, public utilities, and technocracy.*

Twelve courses out of thirty-one treat World Geography Topics, with a frequency of 1,117 items. The range of countries covered in this division is so wide that it does not indicate any definite trends.

In World History Topics the "Period of Industrial Revolution," which has an index of 6:984/31, is treated most often. Next in emphasis is "Modern Asia," with an index of 5:259/31.

In most instances the classification Government Topics does not appear before the seventh grade, where the total index is 8:1206/31. Under this classification are included such topics as *federal, state, and local government.* The emphasis seems to be on the *legislative, executive, and judicial* functions.

Very few schools teach United States Geography Topics in the seventh grade. Here, again, no one area seems to be given sufficient attention to indicate trends of any kind.

State History and Geography Topics are studied in the seventh grade in eleven of the thirty-one courses examined. The frequency of 1,034 items indicates that greater emphasis is given State History and Geography Topics on the seventh grade level than on any other level.

Grade 8

In social studies, grade 8, twenty-nine courses of study out of thirty-one treat Social Problems Topics. This indicates a definite increase over the seventh grade. These Social Problems Topics cover a wide range and include forty-two major units or topics. Considerable em-

phasis is given to "Education" (18:546/31), "Industry" (15:873/31), "Transportation" (15:696/31), "Trade and Commerce" (13:579/31), "Labor" (12:227/31), and "Communication" (12:207/31). It is interesting to note the importance given to the topic of *education*, which is considered by more than half of the courses of study. The growing importance of *labor* and *labor organizations* is reflected by the fact that twelve of thirty-one courses of study treat this topic. That this treatment is superficial is indicated by the low frequency of 227 items. Some rather significant problems, together with their respective indexes which indicate that they are receiving scant treatment, are "Safety" (2:70/31), "Rural Life" (2:66/31), "Crime" (2:37/31), "Propaganda" (1:17/31), and "Housing" (1:10/31).

The emphasis on American History Topics at this grade level seems to be placed on recent events, "The United States as a World Power" having an index of 22:2078/31 while "European Background" has an index of only 3:40/31. It is evident that course of study writers place their emphasis on Old World background and early American history in the intermediate grades rather than at the eighth grade level. Significant treatment is also given to the "Period of Big Business," which has an index of 17:547/31 and includes as sub-headings such items as *corporations*, *effect of machines*, *monopolies*, *tariff*, and *trusts*.

The Government Topics in grade 8, as in grade 7, generally consist of a study of the local, state, and national governments with emphasis on the legislative, judicial, and executive branches of these bodies. Eighteen of thirty-one courses of study in the eighth grade group still have sections organized on the basis of government and citizenship and the majority of these courses follow the typical pattern indicated above.

While eight of the thirty-one courses examined consider World Geography Topics, the countries treated are so scattered that the only conclusion which can be drawn is that, in general, world geography is not extensively treated on the eighth grade level.

World History Topics has a total index of only 3:156/31. This extremely low index shows that slight attention is paid to world history in the eighth grade.

Surprisingly few courses consider State History and Geography Topics at this grade level, this division having a total index of 4:255/31.

Grade 9

In charting ninth grade courses of study no topic divisions similar to those used on previous grade levels were used, since all the content could be classified as Social Problems Topics and Government Topics. Ninth grade social studies courses in both the traditional 8-4 organization and the junior high school organization deal almost entirely with community civics and related problems.

Only fifteen courses of study were analyzed for grade 9. Topics frequently mentioned in this section, together with their indexes, follow: "Government" (12:2477/15), "Education" (10:299/15), "Care of Dependents" (9:440/15), "Health" (9:389/15), "Recreation" (9:198/15), "Conservation of Natural Resources" (8:248/15), and "Religion" (8:126/15). Topics of considerable importance which receive very little emphasis, as indicated by their respective indexes of significance, are: "Technological Changes" (3:100/15), "Democracy" (3:66/15), "Public Utilities" (2:33/15), "Fine Arts and Culture" (2:24/15), "Consumer Education" (1:71/15), and "Advertising" (1:23/15). The wide range of material treated here is indicated by the fact that there are thirty-nine main topics on the ninth grade chart, many of which have subdivisions.

World History

Twenty-three courses of study are included in this section, fifteen being entitled "World History" and eight "Modern History." A study of world history seems to be traditionally included in the tenth grade, but four courses of the twenty-three analyzed include it in grade 9, and several others indicate no grade level at all.

The treatment in world history is chronological and every historical period is studied, though there is, of course, some variation in the emphasis given any one period. The periods treated in world history, together with their respective indexes of significance, are: "Industrial Revolution" (20:528/23), "The World since 1920" (19:2593/23), "Political Revolutions" (18:2024/23), "Dawn of Civilization" (18:1445/23), "The Middle Ages" (17:1837/23), "Nationalism and Democracy" (17:1754/23), "The Renaissance and Reformation" (17:1317/23), "Greece" (17:1227/23), "Rome" (16:1116/23), "Imperialism" (15:800/23), "World War and Peace Treaties" (15:777/23), and "Nineteenth Century Progress" (12:959/23).

Although the number of courses treating each period is almost constant, there are significant differences in frequency. The highest frequency of items occurs in the topic "The World since 1920," with 2,593 items. A total of 2,024 items appear under "Political Revolutions"; subdivisions of this period include the *French Revolution*, the *Revolution of 1848*, and the *English Struggles for Democracy and Reform*.

American History

Although the fourteen American history courses which were charted are all on the senior high school level, there is lack of unanimity as to whether a course in American history is to be placed in the eleventh grade or the twelfth. In general, the fourteen courses in American history give some treatment to every period of American history. There is a noticeable lack of emphasis, so far as frequency of items is concerned, on "European Background" and the "Period of Exploration and Discovery," which have indexes of 12:136/14 and 12:233/14 respectively. This probably can be explained in part by the fact that these periods are rather thoroughly treated in the elementary school.

Decided emphasis is given "The United States as a World Power" (14:1333/14), and "Industrial and Economic Expansion from 1870" (14:1177/14). It is recognized that some of these periods cover a greater span of years than do others, but it is evident that more time is spent on the study of American history since 1865 than on the preceding period. "The Revolutionary War" (14:504/14), "The Civil War" (14:967/14), and "The World War" (14:436/14) are considered important periods by course-of-study writers. The topic "Contemporary America" has an index of 14:828/14, which indicates that course-of-study writers are recognizing the value of placing more emphasis on present-day American history than was done formerly. Items charted under *Contemporary America* cover the period from the close of the first World War up to the present time.

Modern Problems

The social studies chart for senior high school, grades 10, 11, and 12, includes forty-three courses of study for modern problems: eighteen modern problems courses of study, twelve civics and government courses, nine economics courses, and four sociology courses. The topics treated in these four subject matter areas fall naturally under the

major subdivisions, Social Problems Topics, Government Topics, and Economics Topics,⁹ which have total indexes of 40:9428/43, 36:5220/43, and 29:3621/43 respectively. The facts that the greatest number of social studies courses in senior high schools are labeled "modern problems" and that the major amount of content is charted under the heading Social Problems Topics indicate that a modern problems approach is predominant among courses not labeled World History or American History.

Problems receiving significant treatment under the Social Problems Topics, together with their indexes of significance, are: "Education" (25:483/43), "International Relations" (24:769/43), "Transportation and Communication" (22:601/43), "Labor and Capital" (21:695/43), "Care of Dependents" (20:715/43), "Crime" (20:561/43), "Family" (19:471/43), "Race and Population Problems" (18:769/43), "Conservation" (18:331/43), "Agriculture" (14:482/43), and "Public Opinion" (13:300/43).

Problems given surprisingly little treatment are: "Arts and Culture" (5:23/43), "Public Utilities" (4:328/43), "Social Security" (4:81/43), "Housing" (4:70/43), "Youth" (4:34/43), "Community Life Problems" (4:24/43), "Child Labor" (3:97/43), "Insurance" (2:16/43), and "Advertising" (2:5/43).

The topic "International Relations and Peace" has ten subtopics. Considerable emphasis here is given to "Peace and Arbitration" (10:128/43) and "League of Nations" (10:85/43). Because of present conditions there undoubtedly will be significant changes in the treatment of these topics in the courses of the future.

"Government Aid to Agriculture" through the AAA is in about one-fourth of the courses in the social studies on this level, having an index of 10:108/43. The growing importance of *cooperatives* is shown by the fact that this topic under this title has an index of 8:150/43.

The fact that *poverty and relief* is treated in twelve courses out of forty-three examined may reflect economic conditions since 1929 and the establishment of a system of federal relief. Again, the fact that *child labor* is treated in only three courses of study may indicate that course-of-study writers feel that this problem has been largely solved. Some recognition of the *Negro* problem is shown by the fact that nine courses consider this topic under *race and population*. The vogue of

⁹ Economics Topics have been included as a part of the Social Problems Topics on the master unit-topic chart.

technocracy several years ago is reflected by the fact that this topic is considered in four of the courses of study, having an index of 4:60/43.

Courses of study classified under the large heading of Economics Topics tend to follow the classical pattern of college economics teaching; that is, these courses deal with consumption, distribution, marketing, and production. The topic "Distribution" is given the greatest amount of emphasis in this section, having an index of 20:620/43; but "Money, Credit, and Exchange," found in nineteen courses, has the largest frequency, with 1,084 items devoted to it. Only four courses have a separate section on *depressions*, though the *business cycle* is included in five courses.

Thirty-six of the forty-three courses deal with items which are classified under Government Topics. The most thorough treatment of government is found in courses of study labeled "Government and Civics." "Modern Problems" courses also contain a large amount of material on government, but, in general, "economics" and "sociology" courses give little attention to the topic. The fact that almost every economics course of study treats "Taxes" is an exception. Typically, "Government" is treated under the heading of "Local, State, and Federal," with indexes of 18:724/43, 17:635/43, and 18:951/43 respectively. The general topic "Forms of Government" has an index of only 6:55/43; the low frequency would indicate that few of these courses of study give any thorough treatment of contrasting forms of government. Only one course of study treats Fascism, and only one mentions Communism. It is also revealing that there are only thirteen courses of study that treat "Democracy" as a major topic. "Financing the Government," a topic which includes taxes, has an index of 21:751/43, and is the most frequently mentioned of the Government Topics.

More experimentation seems to be under way in social studies courses taught in the last year of high school than is the case at any other grade level. At one time separate courses in economics and sociology were offered for half a semester each. Now the prevailing practice is to offer a course called "Modern Problems," "American Problems," "Problems in American Democracy," or "Community Civics," which deals with many of the same problems formerly included in the formal courses of economics and sociology. In the past the emphasis was placed on a chronological or logical subject matter organization, but

the more recent courses seem to attempt to develop problems in a way that will be of real help and interest to students of senior high school age.

This section on content as shown by unit-topic charts for the social studies is a brief summary of the kind of conclusions and generalizations which can be drawn from these charts.

TYPES OF ORGANIZATION OF SOCIAL STUDIES COURSES

"The social studies," writes Charles A. Beard, in *The Nature of the Social Sciences*, "embrace bodies of knowledge and thought pertaining to the relations of human beings—men, women, and children—to one another and to the physical environment in which they live and work."¹⁰

To find methods of organizing these "bodies of knowledge and thought" into a suitable pattern of experiences for pupils is one of the chief problems faced by those working in the field of social studies. Though the present study has been concerned chiefly with examining the actual content of courses, a consideration of the methods by which content and experiences were organized seems to emerge as a natural by-product. When the 5,029 social studies courses available for this study are examined, especially the 277 which were selected for careful analysis, the following eight types of social studies organizations can be found.

The Separate Subject Matter Organization

Courses of this type range from those which consist of the mechanical listing of discrete subject matter items bearing little relationship to one another, to those which arrange logically the subject matter of the separate fields, but rarely include relationships with other subject matter areas. Unfortunately, the overwhelming majority of the 5,029 courses fall in this category.

Correlation Between and Among Different Social Studies Areas

An increasing number of courses of study are attempting to bring about a closer relationship among the separate social studies fields by

¹⁰ Beard, Charles A. *The Nature of the Social Sciences*. Part VII: *Report of the Commission on the Social Studies*, American Historical Association. New York: Scribner's, 1934.

correlating various aspects of geography, history, civics, and the like. For example, one course offers suggestions for the study of the geography of the Hudson River Valley along with its history. Correlation in the social studies ranges from mechanical, and in many cases unnatural, correlation to the development of relationships that are so interesting, natural, and valuable that the courses might be classified among the most progressive.

Correlation with Other Subject Matter Areas

Approximately half of the seventy-one communities whose courses of study were minutely examined employ this type of correlation. For example, many units on Colonial Life contain suggestions for correlation with certain phases of home economics, such as the study of the food, clothing, and shelter of the colonists, and suggestions for correlation with art through such activities as making scrapbooks depicting life in colonial days. Though such correlation, especially in the junior high school, is sometimes realized by the cooperation of teachers with one another or by the favorable scheduling of classes, it is more often realized by providing larger units such as The Period of Exploration, Transportation, or Conservation. As in the case of correlation within the field, correlation with other subject matter areas extends all the way from a few superficial suggestions to a rather fundamental study of relationships which approaches real integration. Some schools have utilized the theme idea as a method of unifying the entire program for the school and have effectively employed the *guided experience* approach referred to below. Most of the suggestions for integration are found in the courses for the elementary schools. Teachers in the secondary schools seem to be extremely reluctant to give up subject matter classes and courses.

Modern Problems Organization

The *modern problems organization* is one in which the social studies course deals with such topics as housing and city planning, cooperatives, and agriculture. This type of organization, which overlaps those listed both above and below, is spreading so rapidly that it bids fair to become outstanding among the more progressive types.

Broad Fields Organization

In the *broad fields* type of organization subject matter lines within certain broad fields are largely eliminated. The typical "broad

fields" are social studies, language arts, science and mathematics, and the fine and applied arts. In such courses all the so-called social studies fields, such as geography, history, and civics, are subsumed under social studies. Although comparatively few schools are using this organization, it is gaining in several sections of the country.

Core Curriculum Organization

Another type of organization is the *core curriculum*, in which a certain part of the school program—usually from one-third to one-half—is given over to the study of certain core problems, such as protection, transportation and communication, and recreation. In such an organization, there is a tendency to break down all subject matter lines within the core areas. While much of this core is generally drawn from the social studies, a great deal of it comes from other areas.

Guided Experience Organization

The next classification is the *guided experience* organization, in which the teacher attempts to guide the pupils in their selection of and participation in valuable experiences. Courses of study based on this organization contain a wide range of suggested experiences or activities.

Pupil Experience Organization

The final classification might be called the *pupil experience* organization. In this, chief emphasis is placed upon the growth of pupils through experiences in which they are keenly interested. This type of organization, though it overlaps others listed above, deserves a classification by itself, since in its most advanced form it is based on the thesis that experiencing is the thing and that the child alone should decide what these experiences should be. Those holding this point of view do not as a rule prepare courses of study. Occasionally magazine articles and pamphlets report the successes or failures of this type of organization.

SUMMARY

The types of organization listed are by no means mutually exclusive nor do they represent different steps on the same scale. There are in reality at least three scales represented:

1. Courses that emphasize strictly subject matter, as against those that emphasize only pupils' experiences.

2. Courses that emphasize the logical arrangement of subject matter in the older fields, such as geography and history, as against those that stress subject matter dealing with modern social and economic problems.

3. Courses that provide practically no correlation, as against those that correlate and integrate extensively.

Probably most theorists would favor an eclectic approach with regard to the use of the eight types of organization suggested above. When the courses themselves are examined, however, it is found that many fall rather definitely into some one of the eight categories, though many others contain elements of at least two, and sometimes as many as four or five, of these types of organization.

CHAPTER V

Analysis of Courses of Study in Industrial Arts and Vocational Education

INDUSTRIAL ARTS and vocational education have undergone continuous expansion since they were introduced as subject matter courses into the public schools of this country a little more than sixty years ago. Educators today recognize that these combined areas contain unique factors which, if allowed to function in the school program, will make a valuable contribution to education. With few exceptions, the descriptions of educational programs of recent years have mentioned areas of study (or activities) utilizing tools and materials for shop-work. From reports and courses of study received from numerous school systems scattered throughout the United States, it is apparent that our schools differ widely in their objectives and methods and in their offerings. However wide these differences may be, the schools seem to hold in common the belief that industrial arts and vocational education constitute a vital part of their educational program, and the records show that serious effort has been directed toward establishing and organizing the work for these subjects.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION COURSES AVAILABLE FOR THIS STUDY

This section of the report presents the results of an analysis of 223 courses of study in industrial arts and vocational education chosen from among approximately 1,200 courses collected by the Curriculum Laboratory, Teachers College, Columbia University, over a period of fifteen years, 1926-1940. These courses doubtless form the most representative collection of industrial arts and vocational education courses of study that exists in the country today. The following facts concerning these courses are apparent from the data on file:¹

¹ See Tables I and II, Chapter II.

1. More than a third of the courses of study were published before 1924. Subsequent years show a slight but gradual decrease in the number produced each year.

2. The greatest number of courses of study received came from the junior high school (grades 7, 8, and 9), which would seem to indicate that more courses of study are published for this level than for any other.

3. The elementary grades (kindergarten through grade 6) contributed approximately one-third of the courses of study collected and the junior and senior high school grades approximately two-thirds.

EVALUATION OF INDUSTRIAL ARTS AND VOCATIONAL EDUCATION COURSES

Up to the present time approximately 300 courses in the area of industrial arts and vocational education have been judged outstanding, according to the Stratemeyer-Bruner Criteria³ which were used until 1935, and according to the Revised Criteria by Bruner⁴ and others, in use since 1935. The criteria employed are of necessity partially subjective.

A review of the evaluations made over this period reveals the following differences in ratings of industrial arts and vocational education courses of study:

1. The number of courses judged outstanding each year has varied markedly, ranging from 4.7 per cent in 1927 to 100 per cent in 1939. This variation may be due to (a) an actual change in the quality of the courses received during this period, or (b) a change in application of criteria from year to year by different groups of judges. In the main, however, it has been found that different judges, when using these criteria, have given courses approximately the same rating.

2. There is no marked variation in the percentage of courses for the different grades that have been judged outstanding, except in the kindergarten. The small number of kindergarten courses of study received may account for this variation.

It is noticeable that courses in new areas of this field, for example,

³ Stratemeyer, Florence B. and Bruner, Herbert B. *Rating Elementary School Courses of Study*. New York. Bureau of Publications, Teachers College, Columbia University, 1926.

⁴ Bruner, Herbert B. "Criteria for Evaluating Course of Study Materials." *Teachers College Record*, 39 107-120, November, 1937. See Appendix.

household mechanics and general shop, have frequently received higher ratings from the judges than the more traditional courses in the longer established areas like woodworking and mechanical drawing. This may be due to the judges' bias in favor of the newer fields.

SELECTION OF COURSES FOR THIS STUDY

In selecting the courses of study in this area for the present investigation, the following plan was used:

1. Only those courses published between January 1, 1930, and March 31, 1938, were included. When more than one course of study in any area, such as woodworking, was available for any city or state, only the most recent publication was selected.⁵

2. Only courses on the junior and senior high school levels were selected.

3. Preference was given to those courses that met the criteria for the "Revised List of Judged Outstanding Courses," although many other courses were selected.

4. An attempt was made to select a well-balanced representative list of courses of study. Therefore, such factors as geographical distribution and population density were considered.

The courses of study which were finally selected and which are discussed in this section may be considered representative of almost all parts of the United States. The courses of study were sent in by fourteen state departments of education, nineteen cities (some of which are located in these states), and one possession, the Philippine Islands. Approximately one-third of these courses met the criteria used in determining the "outstanding list." The distribution of these courses according to geographical location, the subject matter included in them, and their dates of publication are given in Table XXIX.

TECHNIQUES USED IN THE ANALYSIS OF INDUSTRIAL ARTS AND VOCATIONAL EDUCATION COURSES

After the courses had been selected, the subject matter, or content, of each course was set up in outline form, according to the techniques

⁵A less critical examination of courses published since March 31, 1938, revealed the fact that inclusion of these courses in the present study would not change the results.

described in Chapter II. The application of these techniques, however, was determined by the form of organization that the various courses of study took; some, for example, were outlines of units, while others were outlines made up of such topics as "What the Boy Should Know," "What the Boy Should Be Able to Do," "Projects," and "Related Information." Some of the courses of study consisted of broad divisional headings, such as "I. Objectives," "II. Desired Outcomes," and "III. Teaching Procedures." In a few instances, usually when the courses of study were presented in parallel columns, several columns, such as "Objectives," "Activities," "Materials," and "Desired Outcomes," had to be combined in order to present accurately the subject matter involved. Excerpts illustrative of the forms used in nine of the printed courses are shown on pages 157 ff.

The excerpt in Illustration 16 is taken from a course of study for Printing. In making tabulations of this material each statement in the left-hand column was counted as one item, for example, fifteen items were recorded for "F. Printing." It will be seen that the sub-topics, "a. Define type," "b. Kind of metal used for type," "c. Parts of type," etc., were included in this count. Since the notations under the column entitled "Manipulation" were considered suggestions for using the outline intended for the teacher, they were not tabulated as items representing content.

Illustration 17 shows the exact form of a course of study for Woodworking. In estimating the number of items in this course, not only was each major division and each major subdivision counted as one item, but each item marked a, b, and c and each unidentified item—"footstool," "taboret," and "magazine basket"—was also counted as one item.

The number of items used in the Prevocational Shopwork course of study, an excerpt of which is shown in Illustration 18, was determined by counting the items which were numbered. On this sample page, taken from a course of study for Electricity, the total number of items is twelve.

Illustration 19 shows another form of course of study. The count for this form was derived by considering each sentence as one item. For example, on the first page of the illustration under "7th Grade" we find six items, followed by "8th Grade" with five items. Items on the second page were counted in a similar manner. On the third page only the projects in the left-hand column were counted as separate

TABLE XXIX

Industrial Arts and Vocational Education Courses Included in

State	GENERAL SHOP		MACHINE SHOP		HOUSE-HOLD MECHANICS		WOODWORK		MECHANICAL DRAWING	
	Jr	H S	Sr	H S	Jr	H S	Jr	H S	Sr	H. S.
Arizona										
State, 1936.....		1					1		1	
Arkansas										
Little Rock, 1932 ...		2								
California										
Fresno, 1936. . . .							3	4		1
Oakland, 1932										
Sacramento, 1931 .							1		1	1
Delaware										
State, 1933.....							3		1	
Florida										
State, 1930	1		1		1			1		1
Idaho										
State, 1933.....					1					
Iowa										
State, 1930							1		1	
Kansas										
State, 1933							1			2
Maryland										
Baltimore, 1933-35 .				1**			1			
Massachusetts,										
Malden, 1936 . . .								4		1
Springfield, 1934 . .					2		1			
Michigan										
State, 1930				2						
Detroit, 1932 . . .		1								
Flint, 1933.....		2		2			2	2		
Minnesota										
State, 1930.....		1		1			1	1	1	1
Missouri										
St. Louis, 1930 . . .					1		2		2	
Nevada										
State, 1934... . . .							1	1		1
New York										
State, 1931, 1935....	5**	2*					3	1		

TABLE XXIX (Continued)

This Study, Showing Specific Areas and Geographical Location

ARCHI- TECTURAL DRAWING	MACHINE DRAWING	ELECTRICITY		AUTO MECHANICS		METAL WORK	PRINTING	Totals
Sr. H. S.	Sr. H. S.	Jr. H. S.	Sr. H. S.	Jr. H. S.	Sr. H. S.	Jr. H. S.	Jr. & Sr. H. S.	
								3
				1				3
1		1				1	1	12
			2					2
1						2		6
		1		1		1		7
			1			1	1	8
								1
		1				1		4
						1*		4
		2				3	1	8
2	2					1*		10
		1				1	1	6
		1						3
				2				1
								10
1	1	1			1	1	2	13
		1				2	1	9
								3
1		3	1	4		8		28

TABLE XXIX (Continued)

State	GENERAL SHOP	MACHINE SHOP	HOUSE- HOLD ME- CHANICS	WOODWORK		MECHANICAL DRAWING	
	Jr. H. S.	Sr. H. S.	Jr. H. S.	Jr. H. S.	Sr. H. S.	Jr. H. S.	Sr. H. S.
New York (<i>Cont.</i>)							
Albany, 1930.....	1						
Ithaca, 1930-31.....	3						
Rochester, 1936.....		4			4		
Oklahoma							
State, 1930.....				1			
Pennsylvania,							
Philadelphia, 1935-37				3		3	1
Pittsburgh, 1931-32 .							
Philippine Islands, 1933			1	1	2		
Rhode Island,							
Providence, 1935....				3		1	
South Dakota							
State, 1935.....	1				1		1
Texas							
State, 1936.....	1*						
Fort Worth, 1930....	3				3		1
Houston, 1932.....							
Washington							
State, 1930.....		2		2	1	3	
Wisconsin							
Appleton, 1932.....	1						
Totals by Specific Areas	25	13	6	31	25	14	11

* Senior High School. ** Junior High School.

TABLE XXIX (Continued)

ARCHI- TECTURAL DRAWING	MACHINE DRAWING	ELECTRICITY		AUTO MECHANICS		METAL WORK	PRINTING	Totals
Sr. H. S.	Sr. H. S.	Jr. H. S.	Sr. H. S.	Jr. H. S.	Sr. H. S.	Jr. H. S.	Jr. & Sr. H. S.	
								1
								3
		1	3	1	3			16
								1
	2	1	3		3	2		18
			1				1	2
								4
								4
1	1					1		6
								1
1	1							9
1								1
1	1	2	1		1	1		15
								1
10	8	16	12	8	9	27	8	223

* Senior High School. ** Junior High School.

items, for the items in the right-hand column were considered classifications for the projects listed.

An Auto Mechanics course of study, Illustration 20, shows still another form. Each statement in this form was counted as one item. For example, in the center of the page under "Unit 2. The Chassis" there are three items.

Another form for a course of study based on assignments is shown in Illustration 21. In making a tabulation for this type of course of study each numbered assignment was counted as one item. In this excerpt, taken from the course in Automobile Mechanics, there are twelve items.

The calculations for these items are used in the tables portraying the content patterns of the various subjects, and are interpreted on page 33. In translating the courses of study into outline form every effort was made to preserve the original meaning.

After the courses of study had been put in outline form, unit-topic charts were constructed to show what was actually the content of all the courses within given areas, for example, junior high school Printing and senior high school Mechanical Drawing. The techniques used in making these charts have been described in Chapter II.

The following classifications show to which school levels the various courses belong:

Junior High School

Auto Mechanics
Electricity
General Shop
Household Mechanics
Mechanical Drawing
Metal Work
Woodwork

Senior High School

Auto Mechanics
Electricity
Architectural Drawings
Machine Drawing
Mechanical Drawing
Machine Shop
Woodwork

*Junior and Senior High School
Printing*

Few of the junior and senior high school courses in Printing were allocated to a specific grade level; the majority were simply classified as belonging to the junior high school or the senior high school. Therefore, because of the small number of printing courses available for either school level, it seemed advisable to combine all printing courses for both junior and senior high school.

ILLUSTRATION 16*

Outline of Courses			
Information	Sources of Information	Manipulation	Projects
<p>F. Printing</p> <ol style="list-style-type: none"> 1. Type and its parts <ol style="list-style-type: none"> a. Define type b. Kind of metal used for type c. Parts of type d. Standard height of type 2. Measurement of type <ol style="list-style-type: none"> a. The point system b. Relationship between point, pica, and inch c. The printer's rule, line gage, or pica rule 3. Kinds of type <ol style="list-style-type: none"> a. Classes of type b. Faces of type c. Series of type d. Type families <p style="text-align: center;">— 68 —</p>		<p>Handle large-sized type and locate the parts</p>	
		<p>Measure large-sized type, by points and inches, checking up the comparison</p> <p>Pick out and identify the font or fonts to be used commonly in practice composition</p> <p>.....</p> <p style="text-align: center;">— 69 —</p>	

* *The Secondary School Curriculum and Syllabi of Subjects* Bulletin No. C-5. Industrial Arts, Minnesota State, June 1930.

ILLUSTRATION 17†

WOODWORKING

8. GRADE

Review of work covered in 7th grade to determine progress made in elementary work.

I. Standard of workmanship in the use of tools and be familiar with the principles of woodworking.

A. Have the following abilities and skills concerning hand tools

1. Read a standard rule

What Our Schools Are Teaching

- a. Know the divisions of a rule to the sixteenth of an inch.
 - b. Measure accurately to the sixteenth of an inch.
 2. Construction of a dado joint
 - a. Layout of joint
 - b. Use of a router plane
 - c. Ability to construct accurately
 3. Construction of cross-lap joint
 - a. Lay out and cut accurately
 4. Construction of Mortise and Tenon joint
 - a. Lay out and cut accurately
 - b. Use of a mortise chisel and butt chisel
 5. Use of glue in assembling
- List of suitable projects
- Footstool
- Taboret
- Magazine basket
-

† *A Course in Manual Arts*. Dover, Del.: State Department of Public Instruction, 1933.

ILLUSTRATION 18***PREVOCATIONAL SHOPWORK****2.****Electricity****WHAT THE PUPIL SHOULD KNOW AT THE END OF THE COURSE**

1. The value of electricity.
2. How electricity is made, stored, and used.
3. What comprises an electrical circuit.
4. The difference in series and parallel circuits.
5. The difference in A.C. and D.C. currents.

WHAT THE PUPIL SHOULD BE ABLE TO DO BEST AT THE END OF THE COURSE**3.**

1. Work with electricity in a safe and sane manner.
2. Correctly skin and clean a wire.
3. Make three common electrical splices.
4. Solder electrical splices.
5. Tape electrical splices.

* *Tentative Course of Study in Electrical Work, Prevocational Classes*. Baltimore, Md., 1934.

ILLUSTRATION 19†

Section II. Operations and Processes

.....

.....

Laying Out

Planing

7th Grade

7th Grade

Measure to 16th's of an inch
with rule
Lay out lines with try square
Draw lines with pencil
Gage lines with marking gage
Lay out shapes with pattern or
template

Plane surfaces with jack or smooth
plane
Plane edges with jackplane
Plane ends with block plane

8th Grade

8th Grade

Lay out lines with framing square
Draw circles with dividers or
compasses
Lay out angles with sliding T-
bevel
Locate centers with bradawl

Cut recesses with router plane

9th Grade

9th Grade

Lay out mortises with mortising
gage
Lay out lines with combination
square
Draw circles with trammel points

Cut rabbets with rabbet plane
Joint edges with jointer plane

Section III. Related Lesson Topics

.....

.....

Mathematics

(p. 22)

Science

(p. 23)

7th Grade

7th Grade

Division of the rule of 1/16 of an
inch
Material allowance in making
rough cuts

Why a boat floats
Why a kite flies

8th Grade

8th Grade

Board measure and its use
Computing cost of lumber

Effect of wind on sails
The purpose of a keel in a boat's construction
How an airplane flies
Airplane nomenclature

9th Grade

9th Grade

Making a bill of material
Computing the cost of material
Computing areas and volumes
Estimating the cost of a job
Figuring the speed of machines

How to identify common trees
Botanical division of trees
Growth and structure of trees
Glue as an adhesive
Why various woods are used
Seasoning of lumber
Why various finishes are used
Function of lubricants

Section IV. Projects

.....

8th Grade

Group I

Range of Interest

Biplane
Sailboat, scale model
Gun rack
Bow and arrow
Bird house
Mold for paper weight

Aviation
Boat building
Avocational
Avocational
Furniture
Concrete

Group II

Hydroplane
Motorboat, scale model
Canoe paddle
Wagon
Book end
Mold for tea tile

Aviation
Boat building
Avocational
Avocational
Furniture
Concrete

Group III

Airplane, flying model
Yacht, scale model
Indian club
Bookrack
Stand
Mold for flowerpot

Aviation
Boat building
Avocational
Furniture
Furniture
Concrete

† *Tentative Course of Study in Industrial Arts*. General Woodwork for Grades 7, 8, and 9. New York State, 1935.

ILLUSTRATION 20†

8A—COURSE

An outline of what the teacher is expected to accomplish in the 8A mechanics course:

Unit I—Tools and Supplies

Pupil should know:

1. The name, proper use, and price of each tool and supply commonly used in the Auto Shop.

Pupil can do:

1. Keep tool crib neat and orderly.
2. Check tools in and out rapidly and efficiently.

Unit 2—The Chassis

1. Name, location, and function of the major units of the chassis.

1. To grease a car with the aid of a lubricating chart.
2. Sketch the line of power from the gas tank to the road.

Unit 3—The Engine

1. The essential parts of the engine and the purpose of each part.
2. The function of engine main gearings.
3. The four-stroke-cycle principle.
4. Why valve tappets must have clearance.
-

1. Remove and replace a set of manifolds and carburetor.
2. Adjust valve tappets for clearances.
3. Check a motor for correct valve timing.
4. Grind an intake and an exhaust valve.
-

† *Industrial Arts Courses of Study, Junior and Senior High Schools.* Flint, Mich , 1933.

*ILLUSTRATION 21†***SHOPWORK, TENTH YEAR, GRADE 10B***The Automobile Engine**Assignment*

14. Remove and replace pistons (bottom pull out)
15. Remove and replace clutch, throw out bearing
16. Remove and replace distributor (auxiliary shaft drive)
17. Remove and replace starting motors
18. Shop routine assignment
19. Selected project in drilling; hand drill, electric portable, drill pass
20. Remove and replace Bendix drive spring
21. Lubricate clutch, throw out bearing
22. Remove and replace radiators
23. Remove and replace distributor (camshaft drive)
24. Shop routine assignment

.....

† *Tentative Outline in Automobile Mechanics Shopwork and Theory*. Philadelphia, Pa.: Department of Superintendence, Division of Industrial Arts, September, 1935.

**ORGANIZATION OF INDUSTRIAL ARTS AND
VOCATIONAL EDUCATION**

Very definite characteristics have been found in the industrial arts curriculum since its inception in the public schools. The curriculums which most of the courses of study seem to represent may be readily classified according to three characteristics: (1) approaches used in the selection of content; (2) breadth or scope of organization; (3) internal organization of content. These are not the only types of curriculum that exist in this subject matter area, nor are they always sufficiently distinct to permit complete differentiation. They have been chosen for study because they afford a convenient basis for classifying most logically the material at hand.

In Table XXX the 223 courses of study selected for this investigation have been classified according to each of these three characteristics. This classification was made from examination of the printed courses of study. In some instances it was difficult to assign a course to a definite group because it contained elements appropriate to other groups. Such courses were placed under the type to which they seemed most nearly to conform. Although certain courses may therefore not

Course	APPROACHES USED IN THE SELECTION OF CONTENT			BREADTH (SCOPE) OF ORGANIZATION		INTERNAL ORGANIZATION OF CONTENT			
	Total Number of Courses	Emphasis on Anticipated Adult Needs		Emphasis on Pupil's Present Needs	General Course	Unit Course	Formal Arrangement of Skills and Processes	Sequential Projects Prearranged	Differentiated Projects to Meet Individual Needs
		Job Analysis of Trades and Industries	Job Analysis of General Adult Needs						
Column 1	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Architectural Drawing	10	10	0	0	0	10	4	6	0
Senior High School..									
Auto Mechanics	8	8	0	0	0	8	3	5	0
Junior High School..	9	9	0	0	0	9	6	3	0
Senior High School..									
Electricity	16	16	0	0	0	16	10	6	0
Junior High School..	12	12	0	0	0	12	11	1	0
Senior High School..									
General Shop	25	25	0	0	14	11	15	10	0
Junior High School..									
Household Mechanics	6	0	6	0	6	0	0	6	0
Junior High School..									
Machine Drawing	8	8	0	0	0	8	2	6	0
Senior High School..									
Machine Shop	13	13	0	0	0	13	13	0	0
Senior High School..									
Mechanical Drawing	14	14	0	0	0	14	8	6	0
Junior High School..	11	11	0	0	0	11	6	5	0
Senior High School..									
Metal Work	27	27	0	0	0	27	25	2	0
Junior High School..									
Printing									
Junior and Senior High School..	8	8	0	0	0	8	5	3	0
Woodwork	31	31	0	0	0	31	29	2	0
Junior High School..	25	25	0	0	0	25	20	5	0
Senior High School..									
Total.....	223	217	6	0	20	203	157	66	0
Per Cent.	100	97.3	2.7	0	9.	91	70.4	29.6	0

fall 100 per cent within the classifications to which they are assigned, the grouping may be regarded as sufficiently accurate, for the selected courses here represented, to give some indication of the prevailing organization of industrial arts and vocational education courses of study.

In the third, fourth, and fifth columns of Table XXX, three types of organization of the courses with reference to approaches used in the selection of content are given. Two of the three types place the emphasis upon expected adult needs of the pupil.

Job Analysis of Trades and Industries

The first of the types using adult needs as their basis is *job analysis of trades and industries*. It is described in a bulletin of the U. S. Office of Education as follows:

Industrial Arts courses should be organized by selecting from countless industrial processes used in manufacturing and from numbers of highly organized trades in which skilled workers have participated for ages, those units which will best show accord with the social needs. . . . Organization of subject matter based on industrial trades has been the general practice for work on the high school level.⁶

Table XXX shows that a total of 217, or 97.3 per cent, of the courses were placed within this classification.

While the job analysis approach has undoubtedly undergone certain changes, it is fundamentally the same as that used in the organization of teaching material by the Russian Imperial Technical School at Moscow in 1875.⁷ It is by far the approach most commonly used today and may be said to reveal better than any other the present industrial arts program. While it is admitted that the job analysis approach is basic in determining the content of vocational courses preparing for a specific occupation, some consider it inadequate as a method of selecting content, contending that the goal of the industrial arts classes is the attainment of cultural, recreational, and general educational values. Many courses claiming industrial arts values use this method of selecting subject matter; but justification for this procedure, when considered in the light of the expressed purpose of the course, often seems questionable. Traditional content is so strongly

⁶ *Industrial Arts, Its Interpretation in American Schools*. Bulletin 1937, No. 34, p. 71, 1937. Washington: Superintendent of Documents.

⁷ Bennett, Charles A. *History of Manual and Industrial Education, 1870 to 1917*, Chap. I. Peoria, Ill.: Manual Arts Press, 1937.

entrenched that little change has been made, even though the stated function of the subject and the values claimed for it have changed tremendously. If real progress or achievement is to be expected, ends and means must be brought into a functional relationship.

Analysis of General Adult Needs

A second approach used in selecting content is the *analysis of present general adult needs*. With respect to this approach Bobbitt says:

It is helpful to begin with the simple assumption, to be accepted literally, that education is to prepare men and women for the activities of every kind which make up, or which ought to make up, well-rounded adult life; . . . Education is primarily for adult life, not for child life.⁸

This method has not influenced the industrial arts courses to the same degree as analysis of trades, although the two methods are quite similar. Six courses, or 2.7 per cent of the total, appear to have been developed by using an analysis of present general adult needs. This approach was most often found in connection with home mechanics, general electricity, general woodwork, and other courses in industrial arts that claim "general" values. Like the *job analysis of trades and industries* pattern, this approach uses the future needs of the student as the basis for the selection of content. There is some indication that this approach is gaining in favor among curriculum makers in industrial arts.

The Present Needs of the Pupil

A third approach, one found very infrequently and generally used for only a single part of a program, aims at the selection of content in terms of *the present needs of the pupil*. This basis of selection is mentioned in both oral and written expositions but is seldom found in actual practice. Not one course among the 223 considered in this study appeared to belong in this classification,⁹ although in a few instances part of a course was evidently prepared with this aim in mind. These

⁸ Bobbitt, Franklin. *How to Make a Curriculum*, pp. 7-8. Boston: Houghton Mifflin Company, 1924.

⁹ A program using this approach is reported to have been carried on with success in several experimental schools. Some of the experimental schools working under the Eight Year Experimental Study of the Commission on the Relation of Secondary School and College of the Progressive Education Association are also making some attempts to use this approach.

few instances show interesting possibilities and suggest the existence of close relationship between the expressed purposes of the course and its content.

Examination revealed that the courses of study almost entirely represented content growing out of certain trades and industries. This fact would seem to indicate that these courses are vocational in nature even though many of them claim non-vocational functions. It should be repeated that, as nearly as could be determined, not a single course in any of the subjects included under industrial arts had as its primary objective provision for the immediate interests, needs, and problems of the pupils.

BREADTH OR SCOPE OF COURSES

Organization of subjects may be examined from another standpoint, namely, the *breadth* or *scope* of the courses in industrial arts and vocational education. Columns 6 and 7 of Table XXX show two distinct trends in breadth of organization of courses. The unit course, or unit shop plan of organization, involves content selected from one division in industry or from one trade, such as printing or electricity. When this type of organization is used the content is almost always selected through the *analysis of trades and industries* approach. Table XXX shows that 203 courses, 91 per cent of the total, can be classified under the *unit shop plan* of organization. This method has been widely accepted for vocational training courses, but whether it is equally suited to industrial arts courses is doubtful.

When the *general shop plan* is used, content relating to many trades and activities is merged and is introduced into one class organization which provides for the general needs of many kinds of practical activities. The general shop is of two types: one is organized to provide training in skills for two or more so-called fundamental trades; the other is organized to teach the skills needed in various practical activities requiring the use of many types of tools, equipment, and materials, without regard for any particular trade.

Only twenty, or 9 per cent, of the courses are classifiable under the general shop plan. These figures are significant in view of the fact that twenty-five of the courses are listed in the courses of study as General Shop courses, and many others as "general" courses, for example, General Electricity, General Metal Work, and General Woodwork.

Aside from the General Shop courses Household Mechanics is the only course included in this table under the general shop plan. These figures seem to indicate that many courses are of the nature of general shop, but that when the content and the pattern of their organization are examined, they apparently belong under the heading of unit shop organization.

Many types of shops have been given the name "general shop." The type of shop in which equipment is stored for two or more kinds of work but which is used by *only one class in one kind of work* during a given period is frequently called a general shop. With such an arrangement the teacher may hold a class in electrical work during one period, and a class in woodworking during another, using the same shop, which to all physical appearances resembles a general shop, but because of the type of organization used, loses the distinctive characteristics usually ascribed to the general shop. In this study the name "general shop" is applied only to a shop in which *several types of work are in progress at one time*.

INTERNAL ORGANIZATION OF CONTENT

The curriculum may be considered from a third standpoint, that of the *internal organization of content*, as shown in columns 7, 8, and 9 of Table XXX. At least three types of internal organization are recognizable. The first has a *formal arrangement or combination of skills, processes, or knowledges*. The arrangement is usually determined first by the difficulty involved in learning the skill, in handling the process, and in acquiring the knowledge; and second by the ease with which prerequisites to the course have been met. This type of organization of content is generally used when content has been selected by the analysis of either trades or adult needs. It is found under both the unit and the general shop plan. One hundred fifty-seven courses of study, or 70.4 per cent of the total number, use the formal arrangements of skills, processes, and knowledges as their method of internal organization.

A report of the American Vocational Association,¹⁰ which has been widely distributed and has had marked influence on course of study organization in industrial arts, furnishes an example of this method of

¹⁰ *Standards of Attainment in Industrial Arts Teaching*. Pittsburgh, Pa.: American Vocational Association, December 7, 1934.

internal organization. Illustration 22, taken from this report, is the outline of one of the eleven units (Woodworking, Printing, Forging, etc.) organized within industrial arts.

The second type of internal organization of content is known as *sequential projects prearranged*. Under this plan a project or a series of projects constitutes the course. The projects are usually arranged in the order of difficulty, and their plan of presentation is determined in advance so that the entire class takes up each project in the same sequence. In some cases this plan is accompanied by an instruction sheet which contains the plans and directions for making the project. These instructions are usually in detailed and fixed sequential order. Sixty-six courses, or 29.6 per cent, were classified as "sequential projects prearranged."

This plan has been criticized chiefly on the ground that it does not take into account the individual differences among students. The advocates of the plan claim it has an advantage over a more formal arrangement in that *it treats the learning situation as a whole*; and that, even though some of the projects may not have been well selected, it enables the pupil to see the relationship between the various skills, processes, and knowledges by completing the project. In some courses the pupil must take up a list of projects or jobs in their prescribed order; in others he is allowed to select from a list of projects prepared by the teacher. The learning involved in each project is assumed to contain fundamental processes that the teacher believes should be experienced by the pupil. This method is thought by some to be superior to the sequential project plan inasmuch as it provides a wider selection from which the student may choose and is more flexible.¹¹

The third type of internal organization of content, which is closely related to the third type of selection of content discussed earlier, is the *project differentiated to meet individual needs*. This plan allows the pupils to select the projects or problems from an almost unlimited number of interests and activities. The chosen project may be related to other school subjects; it may grow out of recreational interests of the pupil; it may develop from the actual needs of daily living in school or at home; or it may grow out of curiosity to explore the possibilities of various tools and materials. The plan is based on the theory

¹¹ An excellent discussion of the latter method is found in Ericson, E. E. *Teaching Problems in Industrial Arts*, p. 155. Peoria, Ill.: Manual Arts Press, 1930.

ILLUSTRATION 22†

2. Woodworking

.....

I. The Things You Should Be Able to Do

Group I

1. Read a working-drawing
 2. Make out a bill of material
 3. Plan the procedure in doing your jobs
 4. Check material when received
 5. Measure and divide spaces with a rule
-

Group II

54. Adjust a block-plane
 55. Cut curves with a compass-saw
 56. Use a gouge for gouge work
 57. Smooth a surface with a scraper
 58. Lay out a hexagon
-

Group III

77. Cut curves with a turning-saw
 78. Lay out an ellipse
 79. Put on locks
 80. Put on drawer-pulls
 81. Fit hinges
-

III. The Things You Should Know

1. Concerning Lumber

-
 3. You should know the methods of cutting and milling lumber
 4. You should know how lumber is dried
 5. You should know the effect of moisture on wood
 6. You should know the standard dimensions of lumber and how classified
-

5. Concerning Screws

1. The kinds of screws
 2. The uses of the different kinds
 3. How the sizes and kinds of screws are indicated
 4. How they are sold
-

†*Standards of Attainment in Industrial Arts Teaching*. Pittsburgh, Pa.: American Vocational Association, December 7, 1934.

that present experiences in living should largely decide the content and organization of the course.¹²

The impracticability resulting from carrying this theory to an extreme is described in *Teaching Problems in Industrial Arts*.¹³ Since many of the courses analyzed in this study are committed, according to their stated objectives, to the principle of serving the needs of the individual and taking into consideration individual differences among pupils, it would seem that some courses should appear under this last classification. Table XXX shows, however, that no courses could be classified under individual differences.

Moreover, the data show that almost 75 per cent of the courses examined are a logical, sequential arrangement of teacher-selected facts and skills. Apparently, little cognizance has been taken of the large mass of evidence rapidly accumulating which brings into question the value of a formal organization and which would apply facts and skills in the solution of problems vital to the learner. If industrial arts is to serve individuals widely varying in needs, interests, and problems, the type of organization today most often employed may fail to provide the most effective program of study.

CONTENT OF INDUSTRIAL ARTS AND VOCATIONAL EDUCATION COURSES

A summarization of the data given in each of the fifteen unit-topic subject matter charts listed on page 156 is found in Tables XXXI to XLV inclusive. Certain topic headings in the left-hand column have been slightly reworded to facilitate summarization, but in all instances an effort has been made to retain the meaning of the topics that appeared originally in the courses of study. Differences among these fifteen charts will be discovered because consistency of organization of the charts was considered of less importance than depicting as accurately as possible the topic headings found in the original course of study. An index of significance appears opposite each unit or topic; for example, "Cornice and Sills" (Table XXXI) has an index of 4:94/10; the second item in the left-hand column should be read as follows:

¹² For a fuller treatment of this theory see: Hopkins, L. Thomas, *Integration*, Chap. 13. New York: D. Appleton-Century Co., 1937.

¹³ Ericson, E. E. *Teaching Problems in Industrial Arts*, pp. 156-58. Peoria, Ill.: Manual Arts Press, 1930.

TABLE XXXI

Summary of Unit-Topic Chart in Architectural Drawing (Senior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Architect.....	1:25/10	Pencil Sketching.....	1:19/10
Cornice and Sills.....	4:94/10	Perspective.....	4:9/10
Details.....	8:56/10	Roofs.....	1:17/10
Doors.....	4:77/10	Sashes and Frames.....	1:12/10
Elevations.....	6:70/10	Shade and Shadow.....	2:8/10
Floor Plans.....	2:15/10	Site.....	1:17/10
Flues and Fireplaces.....	4:31/10	Specifications (Estimation)	5:20/10
Foundations.....	4:42/10	Stairs.....	4:57/10
Framing.....	3:53/10	Structural Drafting.....	1:220/10
Garage Plans.....	1:1/10	Symbols.....	2:41/10
House Planning		Tracing.....	2:2/10
and Construction.....	6:218/10	Types of Architecture.....	2:32/10
Lettering.....	6:52/10	Vertical Section.....	2:18/10
Model House Building....	2:3/10	Wall Covering.....	2:25/10
Molding.....	2:46/10	Windows.....	4:84/10
Orders of Architecture....	1:1/10	Related Information.....	1:2/10

Note: This table should be read as follows, taking the second item as a sample: The unit topic "Cornice and Sills" in Senior High School "Architectural Drawing" appeared in 4 out of 10 courses and included a total of 94 items.

"In senior high school Architectural Drawing the unit-topic "Cornice and Sills" appeared in four out of ten courses and included a total of 94 items."¹⁴

Architectural Drawing

A numerical summary of the unit-topic chart for senior high school Architectural Drawing is given in Table XXXI. This table is based on an analysis of ten courses of study. "House Planning and Construction" was found in six out of the ten courses, with a total of 218 items. This unit topic appears to be the core of the six courses. The other unit topics named in any one of the courses are included in so small a percentage of the others and differ so widely in content that they are of little significance as patterns. From the data presented here, then, it will be seen that the similarity in content was slight among the courses in senior high school Architectural Drawing, with the exception of the unit topic "House Planning and Construction."

¹⁴ For a more detailed explanation, see Chapter II.

In this connection the new approach to the study of Architectural Drawing recently suggested by E. E. Ericson is of interest:

. . . In other words, instead of beginning with the parts, we would begin with the whole. We would let the student begin where he is now, living in a home that is either owned or rented, and living with furniture or furnishings that belong either to the family or to someone else. It seems to me that the logical starting point for this type of activity is under the conception of "Home Planning," rather than "Architectural Drawing."¹⁵

This approach is further elaborated in an article by George H. Hargitt,¹⁶ which gives practical suggestions for conducting a class according to this theory. The direction of revision in the approach to Architectural Drawing indicated in the above quotation will show the kind of revision that is needed in many other areas included in industrial arts.

Auto Mechanics

The nature of the content of junior high school Auto Mechanics, as revealed by the unit-topic chart, is shown in Table XXXII. In preparing this chart eight courses of study were analyzed. "Electrical Assembly" appears in five courses, with a total of 122 items; "Engine and Motor" in six courses, with a total of 120 items; and "Repair and Maintenance" in all eight courses, with a total of 107 items. These three are the only topics which appear in Auto Mechanics with any degree of consistency or any substantial amount of treatment. Numerous items, for example, "Springs," "Valves," and "Threads," appear in only one or two courses of study. "Related Content" (6:112/8) is related to various school subjects. Only two of eight courses of study in Auto Mechanics treat *safety* and they have a total of only eight items. The small number of courses available in this subject prevents making an analysis of the value of such courses.

The nature of these topics suggests that they came from an analysis of the auto mechanic's trade. "Cold Weather Operation" and "Fenders and Upholstery," which might be related to the needs of the operator

¹⁵ Ericson, E. E. "New Objectives in Architectural Drawing." *Industrial Education Magazine*, Vol. 39, No. 3, p. 149, May, 1937.

See also Ericson, E. E. and Soules, Roy L. *Planning Your Home*. Peoria, Ill.: Manual Arts Press, 1938.

¹⁶ Hargitt, George H. "Home Planning—An Important Industrial-Arts Subject" *Industrial Education Magazine*, Vol. 39, No. 5, pp. 260-265, November, 1937.

TABLE XXXII

Summary of Unit-Topic Chart in Auto Mechanics (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Chassis	2:12/8	Transmission	2:16/8
Clutch.	2:17/8	Repair and Maintenance .	8:107/8
Cold Weather Operation. .	1:11/8	Springs	1:12/8
Cooling System	1:9/8	Steering Gear.....	2:14/8
Demonstrations	1:14/8	Valves	1:11/8
Differential	1:7/8	Wheels and Axles	3:18/8
Electrical Assembly	5:122/8	Related Content ..	6:112/8
Battery	3:36/8	Design	1:4/8
Generator.....	1:7/8	Economics	3:8/8
Ignition	4:44/8	Geography	1:2/8
Lighting	2:15/8	Guidance	4:13/8
Engine and Motor	6:120/8	History	3:8/8
Fenders and Upholstery . .	1:6/8	Job Information . .	4:26/8
Fuel System and		Mathematics	2:12/8
Carburetor	2:14/8	Objectives	1:6/8
Threads	1:8/8	Safety..... . . .	2:8/8
Tires	4:54/8	Science	4:25/8
Tools and Equipment ...	4:41/8	Homework....	1:53/8

of a motor vehicle, are treated in only one course of study and there very briefly. It is evident that the topics in junior high school Auto Mechanics are selected from an analysis of the activities of mechanics and that little attention is given to many others who need this knowledge to operate a motor vehicle. The latter group includes a large majority of our population, whereas the former represents a small percentage.

Table XXXIII, which is based on nine courses of study, presents a summary of the unit-topic chart in senior high school Auto Mechanics. The content was selected in much the same manner as that used in junior high school Auto Mechanics. "Engine" (6:237/9), "Electrical System" (7:207/9), "Body and Running Gears" (4:152/9), "Fuel System and Carburetor" (7:113/9), and "Pistons and Assembly" (3:100/9) make up the major part of this area in the courses of study. Under "Related Subjects" appear the items *drawing*, *glass*, *history*, *objectives*, and *trade information*, the latter approximating nearly two-thirds of the total number of items included for the entire group of related subjects. Data in Table XXXIII show, as has been said

before, that attention is given not to the needs of the operators of motor vehicles but to the needs of those specifically preparing for the auto mechanic's trade.

TABLE XXXIII

Summary of Unit-Topic Chart in Auto Mechanics (Senior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Axle (Front).....	2:39/9	Operation, Principles of...	1:16/9
Axle (Rear).....	4:66/9	Pistons and Assembly. ...	3:100/9
Battery.	3:22/9	Reaming.....	1:8/9
Bearings.....	2:29/9	Service.....	1:5/9
Block	1:27/9	Shock Absorbers	1:2/9
Body and		Springs.	4:32/9
Running Gears	4:152/9	Starter	3:17/9
Brakes.	5:44/9	Steering Mechanism	5:38/9
Clutch	6:67/9	Timing	3:43/9
Cooling System... . . .	4:55/9	Tires...	2:11/9
Differential.	3:16/9	Tools and Equipment . . .	1:4/9
Electrical System	7:207/9	Transmission	6:54/9
Engine	6:237/9	Universal Joint	3:19/9
Exhaust	2:17/9	Vacuum Control	1:10/9
Fuel System		Valves	4:62/9
and Carburetor.....	7:113/9	Wheels	2:16/9
Generators	2:22/9	Related Subjects	6:127/9
Ignition	3:48/9	Drawing.....	1:12/9
Inspection	1:9/9	Glass.....	1:3/9
Lighting System.....	1:11/9	History	2:11/9
Lubrication	3:42/9	Objectives	3:17/9
Magnets	1:55/9	Trade Information	3:84/9

Claims have been made that general education or cultural values result from technical training in industrial arts. Maris M. Proffitt, of the U. S. Office of Education, in an excellent presentation of this point of view, states:

In conclusion, attention is called to the fact that every civilization has had its dominant element. In Greece the dominant element was art and language. In these activities the Athenian citizen worked assiduously. In Rome it was law and government, and the free Roman citizen perfected himself in these social civic functions. The dominant element in our civilization is industry, in which the machine, together with the use of power which operates it, is conspicuous. Industry and

the machine are largely determining our social order. No one can claim to be cultured in his civilization who neglects to study its dominant element, with its resulting social pattern. Attitudes of minds and forms of behavior that may be realized through proper provisions in industrial arts are essential, not only for developmental experiences related directly to the activities in industrial life, but *for a claim to culture*.¹⁷

To determine whether general educational or cultural values may or may not result from the technical knowledge and skills included in the courses of study examined would require considerably more data than are included in this study. The expressed objectives of these courses, however, did not indicate that they were organized for the purpose of developing cultural appreciations in the students participating in the courses, but there is ample evidence that the technical information and skills acquired are expected to prepare the student for the work of a skilled mechanic. It may be accurately predicted that most students in our junior and senior high schools will become, sooner or later, operators of motor vehicles, and that relatively few will find employment as skilled mechanics. Even for the latter group, it is unwise to attempt to determine the exact skills that will be needed in the auto mechanics trade a few years hence. Some of the content of these courses will undoubtedly become obsolete (particularly that part included in junior high school courses) before the student is ready to take a job. The contents of many courses of study examined include the repairing and maintaining of a Model T Ford. New scientific developments are changing automobile manufacture so rapidly that many processes and operations, both of repair and of manufacture, are short-lived, and soon are abandoned in favor of newer ones. Since this is true, Auto Mechanics needs careful study with the idea of revision to meet more nearly the needs of all pupils enrolled in high school.

Electricity

The content of junior high school Electricity in sixteen courses of study is summarized in Table XXXIV. "Wiring," with a total of 452 items, appears in all of the sixteen courses. "Bell Work," with a total of 134 items, is treated in eleven of the sixteen courses. "Magnetism," with a total of 105 items, appears in ten courses. "Applicances" is

¹⁷ Proffitt, Maris M. "Industrial Arts an Essential in the Curriculum of American Schools." *Industrial Education Magazine*, Vol. 40, No. 5, p. 234, November, 1938.

given an index of 9:105/16. These four topics are given major consideration in this subject. "Electrotyping," "Plating," "Fixtures," "Static Electricity," "Telephone and Telegraph," and "Transformer" appear rather infrequently as units of instruction in junior high school Elec-

TABLE XXXIV

Summary of Unit-Topic Chart in Electricity (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Appliances	9:105/16	Storage Battery	5:41/16
Bell Work	11:134/16	Telephone and Telegraph..	2:9/16
Chemical Electricity . .	3:17/16	Trade Information	5:37/16
Conductors		Transformer.	4:9/16
and Insulators.	7:50/16	Voltage and Pressure . . .	6:36/16
Construction		Wiring	16:452/16
(Experimental).	6:91/16	Circuit	10:195/16
Electrotyping	1:2/16	Fusing	1:4/16
Fixtures	3:27/16	House	10:131/16
In Society.	1:9/16	Joints and Splices . .	8:94/16
Magnetism	10:105/16	Kinds and Uses . . .	4:30/16
Meter Reading.	6:24/16	Related Information . . .	8:111/16
Motors and Generators. . .	5:58/16	Economics	3:7/16
Ohm's Law.	3:13/16	History	4:19/16
Plating.	1:4/16	Mathematics	3:8/16
Radio	3:18/16	Safety	6:24/16
Static Electricity.	1:3/16	Science	8:54/16

tricity. "Radio," with a total of eighteen items, is treated in only three of sixteen courses. Since more than 37 million¹⁸ radios are owned in the United States, it would seem that this topic deserves greater consideration than is revealed by the analysis of these courses. Fifty per cent of the courses in Electricity contain *related information*. With the exception of twenty-four items under "Safety," the remainder of this related information is distributed among the topics "Economics," "History," "Mathematics," and "Science." While the chart as a whole indicates a consideration of the topics traditionally classified under Electricity, in the junior high school this area is almost entirely lacking in interesting and valuable content. Topics or units concerning new electrical appliances, electrical experimentation, amplification,

¹⁸ Reported by Hugh M. Beville, Chief Statistician of the National Broadcasting Company in the *New York Times*, November 17, 1938, p. 2.

the "electric eye," automatic controls, the radio, and other more recent developments might well be considered for these courses.

The unit-topic chart for senior high school Electricity is summarized in Table XXXV. "Principles and Their Applications" (5:339/12),

TABLE XXXV

Summary of Unit-Topic Chart in Electricity (Senior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Automobile Ignition	2 36/12	Magnetism	7:127/12
Bell Work	2:14/12	Measurement	9:332/12
Chemical Electricity	5:30/12	Power	5:125/12
Conductors		Resistance	5:207/12
and Insulators	2:42/12	Motion Picture Machine	1:8/12
Construction		Motors and Generators..	8:316/12
(Experimental)	4 54/12	Principles	
Current	8:285/12	and Applications	5:339/12
A. C	8:202/12	Radio	3:201/12
D. C	4 83/12	Steam Engine	
Drawing	2:26/12	(Source of Power)	1:45/12
Electroplating	2 4/12	Storage Battery	2:34/12
Electrotyping	1:1/12	Telegraph	1:4/12
First Aid	1 1/12	Telephone	2:20/12
In Society (Power Stations		Transformers	4:86/12
Industrial Use)	3:19/12	Wiring	7:175/12
Internal		Circuits	2:69/12
Combustion Engine	1:34/12	Installation	
Lighting (Fixtures)	2:25/12	and Repairs	4:66/12
Machine Shopwork	1:12/12	Joints and Splices	3:40/12

"Measurement" (9:332/12), "Motors and Generators" (8:316/12), and "Current" (8:285/12) receive the major emphasis in this subject. It will be noted that while *bell work* was a major part of junior high school Electricity, it receives only minor consideration (2:14/12) in senior high school Electricity. *Radio* is neglected almost as much on the senior high school level as it is on the junior high school level. *Safety* is not included as a topic in any of the twelve courses and *first aid* appears as one item. Safety precautions in the field of electricity and first aid for accidents due to electrical causes have been overlooked almost entirely as unit-topics in these courses.

General Shop

Twenty-five courses of study were analyzed in junior high school General Shop. A summary of the findings is presented in Table XXXVI. At first glance this table gives the impression that it contains

TABLE XXXVI

Summary of Unit-Topic Chart in General Shop (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Art Metal.....	7:146/25	Rubber.....	2:23/25
Auto Mechanics.....	8:296/25	Sheet Metal.....	13:499/25
Avocational Construction..	1:14/25	Tools, Care of ..	5:83/25
Bench Metal.....	8:144/25	Wood Turning.....	3:56/25
Concrete and Plaster.....	8:260/25	Woodwork	
Electricity.....	16:1146/25	and Carpentry.....	18:1262/25
Forging.....	9:240/25	Related Topics.....	8:725/25
Glazing.....	2:25/25	Consumer Knowledge...	3:57/25
Home Mechanics.....	3:143/25	Drawing and Design....	3:63/25
Home Workshop.....	1:18/25	Economics.....	4:24/250
Leather.....	2:39/25	Geography and	
Machine Shop.....	7:225/25	Transportation.....	3:23/25
Mechanical Drawing.....	12:542/25	History and Biography..	3:15/25
Molding.....	3:74/25	Mathematics.....	3:20/25
Pattern Making.....	2:130/25	Safety.....	3:16/25
Plumbing.....	8:233/25	Science.....	6:250/25
Printing.....	1:37/25	Sociology.....	3:16/25
Rope Work.....	2:32/25	Trade Information.....	6:241/25

a wide variety of offerings. A closer analysis, however, reveals that the work is actually quite limited in scope. The largest amount of content contained in any one topic was found in "Woodwork and Carpentry" (listed variously as *woodwork*, *woodworking*, and *carpentry*), which appeared in eighteen of the twenty-five courses of study, with a total of 1,262 items. This topic comprises chiefly bench work requiring hand tools. "Electricity" (16:1146/25) has almost as large a total number of items as "Woodworking and Carpentry." Twelve courses, with a total of 542 items, treat "Mechanical Drawing." If *related information* is not counted among the items, four topics constitute approximately 60 per cent of the work in this area, namely, "Woodworking and Carpentry," "Electricity," "Mechanical Drawing," and "Sheet Metal." "Auto Mechanics" (8:296/25), "Concrete and Plaster" (8:260/25),

"Forging" (9:240/25), "Plumbing" (8:233/25), and "Machine Shop" (7:225/25) constitute the major portion of the remainder of the program.

More than 10 per cent of the total number of items in junior high school General Shop are found under the classification "Related Topics" (8:725/25). "Science" (6:250/25) and "Trade Information" (6:241/25) constitute about two-thirds of *related topics*. It should be noted that only three of the twenty-five courses have units on *safety*, with a total of only sixteen items, and that *avocational construction*, *glazing*, *home mechanics*, *home workshop*, *leather*, *molding*, *pattern making*, *printing*, *rope work*, *rubber*, and *wood turning*, included in the general shop program, show by the number of units listed for them that they make up only a small part of the whole course.

Reports claim that "handicraft" shops which serve pupil interest in a very effective manner have been organized in certain cities (including Los Angeles and Kansas City), but no course of study showing these "handicraft" courses has been received at the Curriculum Laboratory.

Household Mechanics

The topics and units found in junior high school Household Mechanics are listed in Table XXXVII. The major part of the work in this

TABLE XXXVII

Summary of Unit-Topic Chart in Household Mechanics (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Auto Mechanics.....	2:21/6	Locksmithing.....	1:26/6
Blacksmithing.....	1:48/6	Machine Repair.....	1:26/6
Carpentry and		Metal Work and Repair...	6:111/6
Woodworking.....	6:134/6	Plumbing.....	5:112/6
Concrete and Plastering...	5:70/6	Radio.....	1:68/6
Decoration.....	5:79/6	Recreation.....	1:30/6
Drawing.....	1:36/6	Ropes and Knots.....	1:6/6
Electrical Repair.....	6:176/6	Shoe Repair.....	1:8/6
Heating and Heating.....	1:8/6	Tool Construction.....	1:34/6
Furniture Construction...	1:217/6	Tool Sharpening	
Bamboo.....	1:61/6	and Repair.....	2:55/6
Rattan.....	1:75/6	Upholstery.....	1:9/6
Wood.....	1:81/6	Welding.....	1:26/6
Furniture Repair.....	1:52/6	Miscellaneous.....	3:22/6
Glazing.....	3:12/6		

General Shop

Twenty-five courses of study were analyzed in junior high school General Shop. A summary of the findings is presented in Table XXXVI. At first glance this table gives the impression that it contains

TABLE XXXVI

Summary of Unit-Topic Chart in General Shop (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Art Metal.....	7:146/25	Rubber.....	2:23/25
Auto Mechanics.....	8:296/25	Sheet Metal.....	13:499/25
Avocational Construction..	1:14/25	Tools, Care of..	5:83/25
Bench Metal.....	8:144/25	Wood Turning.....	3:56/25
Concrete and Plaster.....	8:260/25	Woodwork	
Electricity.....	16:1146/25	and Carpentry.....	18:1262/25
Forging.....	9:240/25	Related Topics	8:725/25
Glazing.....	2:25/25	Consumer Knowledge...	3:57/25
Home Mechanics.....	3:143/25	Drawing and Design....	3:63/25
Home Workshop.....	1:18/25	Economics.....	4:24/250
Leather.....	2:39/25	Geography and	
Machine Shop.....	7:225/25	Transportation.....	3:23/25
Mechanical Drawing.....	12:542/25	History and Biography..	3:15/25
Molding.....	3:74/25	Mathematics.....	3:20/25
Pattern Making..	2:130/25	Safety....	3:16/25
Plumbing.....	8:233/25	Science.....	6:250/25
Printing.....	1:37/25	Sociology.....	3:16/25
Rope Work.....	2:32/25	Trade Information.....	6:241/25

a wide variety of offerings. A closer analysis, however, reveals that the work is actually quite limited in scope. The largest amount of content contained in any one topic was found in "Woodwork and Carpentry" (listed variously as *woodwork*, *woodworking*, and *carpentry*), which appeared in eighteen of the twenty-five courses of study, with a total of 1,262 items. This topic comprises chiefly bench work requiring hand tools. "Electricity" (16:1146/25) has almost as large a total number of items as "Woodworking and Carpentry." Twelve courses, with a total of 542 items, treat "Mechanical Drawing." If *related information* is not counted among the items, four topics constitute approximately 60 per cent of the work in this area, namely, "Woodworking and Carpentry," "Electricity," "Mechanical Drawing," and "Sheet Metal." "Auto Mechanics" (8:296/25), "Concrete and Plaster" (8:260/25),

"Forging" (9:240/25), "Plumbing" (8:233/25), and "Machine Shop" (7:225/25) constitute the major portion of the remainder of the program.

More than 10 per cent of the total number of items in junior high school General Shop are found under the classification "Related Topics" (8:725/25). "Science" (6:250/25) and "Trade Information" (6:241/25) constitute about two-thirds of *related topics*. It should be noted that only three of the twenty-five courses have units on *safety*, with a total of only sixteen items, and that *avocational construction*, *glazing*, *home mechanics*, *home workshop*, *leather*, *molding*, *pattern making*, *printing*, *rope work*, *rubber*, and *wood turning*, included in the general shop program, show by the number of units listed for them that they make up only a small part of the whole course.

Reports claim that "handicraft" shops which serve pupil interest in a very effective manner have been organized in certain cities (including Los Angeles and Kansas City), but no course of study showing these "handicraft" courses has been received at the Curriculum Laboratory.

Household Mechanics

The topics and units found in junior high school Household Mechanics are listed in Table XXXVII. The major part of the work in this

TABLE XXXVII

Summary of Unit-Topic Chart in Household Mechanics (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Auto Mechanics.....	2:21/6	Locksmithing.....	1:26/6
Blacksmithing.....	1:48/6	Machine Repair.....	1:26/6
Carpentry and		Metal Work and Repair...	6:111/6
Woodworking.....	6:134/6	Plumbing.....	5:112/6
Concrete and Plastering...	5:70/6	Radio.....	1:68/6
Decoration.....	5:79/6	Recreation.....	1:30/6
Drawing.....	1:36/6	Ropes and Knots.....	1:6/6
Electrical Repair.....	6:176/6	Shoe Repair.....	1:8/6
Fuels and Heating.....	1:8/6	Tool Construction.....	1:34/6
Furniture Construction....	1:217/6	Tool Sharpening	
Bamboo.....	1:61/6	and Repair.....	2:55/6
Rattan.....	1:75/6	Upholstery.....	1:9/6
Wood.....	1:81/6	Welding.....	1:26/6
Furniture Repair.....	1:52/6	Miscellaneous.....	3:22/6
Glazing.....	3:12/6		

course is devoted to "Electrical Repair" (6:176/6), "Carpentry and Woodworking" (6:134/6), "Plumbing" (5:112/6), and "Metal Work and Repair" (6:111/6). "Furniture Construction" shows a total of 217 items, all of which appear in one course of study.¹⁹ Other items listed in this table indicate that the nature of the courses varies greatly. It appears that the content of Household Mechanics has been selected chiefly on an analysis of general adult activities rather than on an analysis of trades.

Machine Drawing

A summary of the unit-topic chart for senior high school Machine Drawing is given in Table XXXVIII. While it is difficult to form

TABLE XXXVIII

Summary of Unit-Topic Chart in Machine Drawing (Senior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Architectural	1:4/8	Levers	2:7/8
Assembly Drawing	4:92/8	Materials, Processes, Terms	4:51/8
Belts	1:2/8	Procedure and	
Cams	5:38/8	Organization	1:13/8
Details	6:101/8	Shafts	3:7/8
Dimensioning	1:27/8	Symbols and Lettering . .	3:46/8
Fastenings	3:34/8	Threads	5:135/8
Freehand Sketch	1:15/8	Tracing and Blueprinting .	4:20/8
Gears	6:91/8	Projects and Problems . . .	5:77/8
Helix, Involute, Spirals . . .	4:23/8		

generalizations from an analysis of only eight courses of study, the data given here reveal little relationship among the topics included under senior high school Machine Drawing. The majority of the courses analyzed consider "Threads" (5:135/8), "Details" (6:101/8), "Assembly Drawing" (4:92/8), and "Gears" (6:91/8).

Machine Shop

Machine Shop, as presented in senior high school courses of study, is summarized in Table XXXIX. This table reveals that most of the work consists of learning to operate the drilling machine, engine lathe,

¹⁹ Philippine Islands, 1933, Grade 7.

TABLE XXXIX

Summary of Unit-Topic Chart in Machine Shop (Senior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Acetylene Welding and Cutting	2:38/13	Grinder	9:205/13
Bench Tools and Equipment	7:242/13	Milling Machine	10:210/13
Drawing	4:4/13	Planer	6:108/13
Drilling Machine	8:140/13	Power Saw	2:22/13
Engine Lathe	10:391/13	Projects	9:205/13
Chuck Work	1:19/13	Safety	1:20/13
Threads	1:52/13	Shaper	8:140/13
Turning on Center	1:43/13	Related Information	7:256/13
Forge and Heat Treatment	4:96/13	Shop Talks and Theory	4:108/13
		Technical Information	5:148/13

grinder, milling machine, shaper, and planer. It is evident that the courses in Machine Shop are based upon trade analysis. *Drawing*, with a total of only four items, appears in only four of the thirteen courses. *Related information*, which consists only of shop talks and technical information, seems to have minor consideration in these courses. Table XXXIX as a whole reveals that Machine Shop is definitely a "doing" course, in contrast to courses which "study about" industrial subjects.

Mechanical Drawing

The content of junior high school Mechanical Drawing is summarized in Table XL. This subject matter division was analyzed in fourteen courses of study. "Materials and Instruments" (8:187/14), "Working Drawings" (4:157/14), "Orthographic Drawing (8:121/14), "Free-hand Drawing" (7:84/14), and "Geometric Exercises" (6:66/14) cover the major portion of the content of this subject. "Use of Drawing," with a total of two items, is found in only two of the fourteen courses. It would appear, then, that here the major emphasis is on technique and that little consideration is given to applying technique to a complete problem.

While the number of courses (eleven) included in the chart for senior high school Mechanical Drawing is probably not sufficient to furnish

TABLE XL

Summary of Unit-Topic Chart in Mechanical Drawing (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Advanced Drafting.....	1:10/14	Laying Out Sheet.....	4:28/14
Alphabet of Lines.....	4:28/14	Lettering.....	6:40/14
Architecture.....	5:33/14	Machine Drawing.....	3:34/14
Blue Print	4:58/14	Materials and Instruments.	8:187/14
Development.....	4:61/14	Measuring (Scale).....	3:27/14
Diagrammatic Drawing...	1:6/14	Orthographic Drawing....	8:121/14
Freehand Drawing.....	7:84/14	Perspective Drawing.....	2:11/14
Furniture Design.....	1:13/14	Reading Drawing.....	3:21/14
Geometrical Exercises....	6:66/14	Symbols for Materials....	3:12/14
Introduction and		Use of Drawing.....	2:2/14
Procedure.....	5:41/14	Working Drawings.....	4:157/14
Isometric.....	3:14/14	Projects.....	4:90/14

data for definite generalizations, the pattern presented by Table XLI shows that Mechanical Drawing gives little consideration to the functional needs of senior high school pupils. "Developments" (8:103/11), "Instruments" (4:99/11), "Orthographic Projection" (10:98/11), "Lettering" (8:83/11), "Isometric" (10:76/11), and "Geometric Drawing" (5:57/11) constitute the main core of the content in this

TABLE XLI

Summary of Unit-Topic Chart in Mechanical Drawing (Senior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Architectural.....	2:10/11	Isometric.....	10:76/11
Assembly and Details....	2:8/11	Lettering.....	8:83/11
Auxiliary Views and		Lines and Dimensions....	5:35/11
Sectioning.....	3:26/11	Machine Drawing.....	4:24/11
Cabinet Drawing.....	3:5/11	Oblique.....	4:7/11
Developments.....	8:103/11	Orthographic Projection..	10:98/11
Freehand Sketching.....	5:24/11	Perspective.....	5:48/11
Furniture Design.....	2:8/11	Principles and Theories....	4:48/11
Geometrical Drawing....	5:57/11	Tracing and Blueprinting..	5:24/11
Inking.....	3:31/11	Working Drawings.....	4:48/11
Instruments.....	4:99/11	Related Information.....	3:38/11
Intersections	6:44/11	Projects and Problems....	5:49/11

area. "Architectural Drawing," "Assembly and Details," and "Furniture Design" appear in only two of the eleven courses analyzed. "Working Drawings," with a total of forty-eight items, appears in only four of the eleven courses.²⁰

Metal Work

Most of the content of junior high school Metal Work, as summarized in Table XLII, was found to be included under three topics:

TABLE XLII

Summary of Unit-Topic Chart in Metal Work (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Art Metal.....	8:425/27	Plumbing.....	3:40/27
Annealing.....	1:12/27	Sheet Metal.....	15:805/27
Cutting, Sawing, Filing..	3:98/27	Assembly.....	2:27/27
Decoration and Finish..	4:81/27	Cutting.....	7:45/27
Drawing and Design....	1:29/27	Developments.....	6:52/27
Etching.....	1:34/27	Forming.....	7:62/27
Hammer Work.....	3:45/27	Joints and Seams.....	4:61/27
Solder and Seams	1:42/27	Riveting and Folding...	5:35/27
Projects.....	5:36/27	Soldering.....	7:72/27
Related Information....	1:22/27	Stake and Rolls.....	4:19/27
		Wiring.....	3:14/27
Bench Metal (Wrought		Projects.....	11:113/27
Iron, Cold Iron Work)	12:448/27	Related Information....	8:235/27
Bending.....	3:19/27	Related Information.....	14:857/27
Cutting.....	3:23/27	Demonstrations.....	3:44/27
Drilling.....	5:34/27	Drawing and Design.....	8:45/27
Finishing.....	1:9/27	Economics.....	5:16/27
Heat Treatment.....	3:40/27	Geography.....	3:10/27
Riveting and Assembly..	4:36/	Guidance.....	8:82/27
Tap and Die.....	3:21/27	History.....	7:33/27
Tools and Layout.....	5:79/27	Homework.....	3:105/27
Projects.....	6:68/27	Job Information.....	7:77/27
Related Information....	3:93/27	Mathematics.....	6:31/27
Forging.....	9:276/27	Metals, Use and Descrip-	
Foundry.....	5:174/27	tion.....	5:324/27
Lathe (Engine).....	5:141/27	Safety.....	6:37/27
Machine Shop.....	2:71/27	Science.....	8:49/27
Pipe Fitting.....	3:45/27	Trips.....	2:4/27

²⁰ Attention of the reader is called to previous comments made concerning Architectural Drawing courses.

"Sheet Metal" (15:805/27), "Bench Metal" (12:448/27), and "Art Metal" (8:425/27). "Bench Metal" also includes "Wrought Iron" and "Cold Iron Work." "Forging," with a total of 276 items, appears in nine of the twenty-seven courses, while "foundry" appears in five, with a total of 174 items. The remainder of the topics represent content of varied nature and indicate no definite trends. It would appear from the data available in this table that most of the work in junior high school Metal Work is concerned with the skills, processes, and knowledges of the sheet metal, art metal, and bench metal trades.

Printing

Eight courses of study were examined in preparing the unit-topic chart for junior and senior high school Printing. A summary of the findings is shown in Table XLIII. "Principles of Composition," with a

TABLE XLIII

Summary of Unit-Topic Chart in Printing (Junior-Senior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Bindery	3:36/8	Makeready	2:57/8
Borders and Rules	5:47/8	Measurement	4:19/8
Commercial Forms	3:204/8	Paper and Cutting	4:39/8
Composition, Principles of	8:228/8	Press, Care of	7:117/8
Costs, Estimating	1:5/8	Press, Feeding	3:31/8
Cuts and Decoration	1:7/8	Proofreading	6:61/8
Display and Layout	6:110/8	Safety	1:8/6
Distribution	5:38/8	Society, Contributions to	1:5/8
English	3:32/8	Trade, Knowledge of	4:23/8
History of Printing	2:8/8	Type and Case	8:153/8
Inks and Inking	5:44/8	Related Information	1:15/8
Locking Up	7:71/8		

total of 228 items, occurred in every course, as well as "Type and Case," with a total of 153 items. "Care of the Press," with a total of 117 items, was included in all courses except one. "Bindery," with a total of thirty-six items, appears in only three of the eight courses.

As a topic of content, "English" is included in three and "History of Printing" in two of the eight courses. It appears that learning to know type and the principles of composition, including the printing of com-

mercial forms, constitutes the major portion of the work in this subject.

Woodwork

A summary of the thirty-one courses of study examined for constructing the unit-topic chart for junior high school Woodwork appears in Table XLIV. "Care and Use of Hand Tools" (23:621/31), "Finish-

TABLE XLIV

Summary of Unit-Topic Chart in Woodwork (Junior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Assembly.....	7:92/31	Upholstering.....	4:15/31
Bending Wood.....	2:8/31	Projects.....	22:456/31
Beveling and Chamfering..	2:19/31	Related Information.....	30:2063/31
Birds and Their Houses...	2:20/31	Abrasives.....	8:43/31
Boring.....	11:107/31	Economics.....	4:18/31
Chisels.....	5:49/31	Fasteners.....	12:179/31
Curved Shaping.....	5:52/31	Furniture Design.....	2:20/31
Drawing and Design.....	11:126/31	Geography.....	3:10/31
Finishing.....	25:578/31	Glue.....	8:77/31
Grinding and Sharpening .	14:143/31	Hardware.....	8:117/31
Hand Tools, Care and Use.	23:621/31	Historical Instruction...	4:54/31
Holding Tools.....	3:56/31	Instruction Sheet	
Joints.....	18:368/31	(Wood).....	3:49/31
Layout.....	9:66/31	Lumber (Forestry).....	20:575/31
Machine Operation.....	14:531/31	Mathematics	
Band Saw.....	3:34/31	(Measurement) (Ratio)	
Circular Saw.....	2:28/31	(Proportion).....	9:62/31
Jointer.....	3:41/31	Objectives.....	4:44/31
Lathe (wood).....	12:325/31	Occupational Information .	12:98/31
Mortiser.....	1:7/31	Operations.....	3:45/31
Sander.....	1:6/51	Period Furniture.....	3:42/31
Surfacer.....	1:7/31	Science.....	3:17/31
Planing.....	10:126/31	Shop Orientation.....	6:55/31
Safety and First Aid.....	7:64/31	Sociology.....	3:12/31
Sawing.....	10:107/31	Tools and Materials.....	16:502/31
Squaring.....	8:211/31		
Surface Treatment	3:78/31		

ing" (25:578/31), "Machine Operation" (14:531/31), "Joints" (18:368/31), "Squaring" (8:211/31), "Planing" (10:126/31), "Boring" (11:107/31), and "Sawing" (10:107/31) are the topics studied most

often in Woodwork, exclusive of *related information*. The *wood lathe* is included in twelve of the thirty-one courses. Apparently little time is given to such items as *layout*, *bending wood*, *safety and first aid*, *surface treatment*, and *upholstering*.

Related information appears often in junior high school Woodwork. Thirty of the thirty-one courses, with a total of 2,063 items, include various kinds of related information. An analysis of this item indicates

TABLE XLV

Summary of Unit-Topic Chart in Woodwork (Senior High School)

Unit Topic	Index of Significance	Unit Topic	Index of Significance
Abrasives.....	2:29/25	Repair Work.....	2:46/25
Assembly.....	1:49/25	Sander.....	1:18/25
Band Saw.....	1:25/25	Saw Filing.....	1:23/25
Bill of Materials.....	1:37/25	Sawing.....	3:49/25
Boring.....	2:31/25	Squaring Stock.....	3:50/25
Building Construction		Surfacer.....	1:30/25
(Codes, Details).....	2:555/25	Surface Treatment.....	3:139/25
Chiseling.....	2:15/25	Tools, Equipment and	
Concrete Work.....	2:91/25	Materials.....	6:391/25
Decoration.....	3:51/25	Universal Saw.....	2:122/25
Drawer Construction.....	1:9/25	Upholstering.....	4:70/25
Drawing and Design.....	7:503/25	Vocational Guidance.....	4:96/25
Driving Tools.....	1:16/25	Weaving.....	2:16/25
Engine.....	1:13/25	Wood Turning.....	6:202/25
Fastening.....	5:99/25	Center.....	1:32/25
Finishing.....	12:549/25	Chuck.....	1:9/25
First Aid.....	2:82/25	Face Plate.....	1:14/25
Fundamentals.....	1:17/25	Projects.....	9:299/25
Furniture Construction....	7:158/25	Related Information.....	14:1122/25
Glueing.....	5:102/25	Art.....	3:105/25
Grinding and Sharpening..	3:32/25	English.....	1:4/25
Hardware.....	4:48/25	Lumber.....	3:57/25
Jointer.....	2:74/25	Manufacture (Wood)...	3:16/25
Joints.....	6:231/25	Mathematics	
Layout.....	4:37/25	(Proportion).....	3:115/25
Machine Operation.....	5:263/25	Outside Work.....	3:17/25
Mortiser.....	2:37/25	Physics.....	2:48/25
Paneling.....	1:10/25	Safety.....	4:125/25
Patternmaking.....	5:402/25	Science.....	3:311/25
Period Furniture.....	3:64/25	Shop Organization.....	2:30/25
Planing.....	2:21/25	Social-Economic Factors.	2:262/25
Planning.....	2:14/25		

that *lumber* (which includes a study of woods and forestry), *fasteners*, *tools*, and *hardware* receive the greatest emphasis. The remainder of the items included under this heading are distributed among topics of wide range, covering a number of other school subjects, such as science and history, as units of instruction. Since more than 34 per cent of the items used in junior high school Woodwork are listed under *related information*, "studying about" Woodwork is given a more important place in these courses than "doing." A few courses, however, are almost entirely concerned with having the student "do" things.

Senior high school Woodwork offers a very wide range of topics, as is shown in Table XLV. With the exception of "Related Information," the following topics constitute most of the work in this area: "Finishing" (12:549/25), "Drawing and Design" (7:503/25), "Patternmaking" (5:402/25), "Tools, Equipment and Materials" (6:391/25), "Machine Operation" (5:263/25), "Joints" (6:231/25), "Wood Turning" (6:202/25), and "Furniture Construction" (7:158/25). "Related Information" (14:1122/25) includes a rather wide range of topics, with a number of other school subjects appearing as units of content. It will be noted that "Drawing and Design" (7:503/25) is given much greater emphasis on the senior high school level than was found in Woodwork (11:126/25) on the junior high school level. As topics, "Safety" (4:125/25) and "First Aid" (2:82/25) are treated meagerly. They are discussed only in relation to the machines used in these courses. The chart as a whole would indicate a rather broad treatment of "Building Construction" (2:555/25). It will be noted, however, that the large number of items represent only two courses of study.²¹

SUMMARY OF CONTENT IN INDUSTRIAL ARTS

Table XLVI presents a list of topics taken from the master unit-topic chart for Industrial Arts, which is a summary of the fifteen unit-topic charts. A few topics have been combined or reworded in order to make the meaning clearer. The extreme right-hand column presents the Total Index of Significance, which indicates the entire extent to which these topics were treated in industrial arts. One topic, "Related Information," appears in twelve of the fifteen areas of industrial arts. If an analysis of these courses of study may be considered

²¹ Nevada State Course of Study, *Manual Arts*, 1934. New York State Course of Study, *Building Construction*, 1931.

TABLE XLVI
Topics Taken from Master Unit-Topic Chart for Industrial Arts

ARCHITECTURAL DRAWING	AUTO MECHANICS		ELECTRICITY		GENERAL SHOP	HOUSEHOLD MECHANICS	MACHINE DRAWING
	Jr. H. S.	Se. H. S.	Jr. H. S.	Se. H. S.	Jr. H. S.		
(Col. 1)	(Col. 2)	(Col. 3)	(Col. 4)	(Col. 5)	(Col. 6)	(Col. 7)	(Col. 8)
Blue Printing and Tracing.....	2:2/10						4:20/8
Drawing and Design.....	1:4/8	1:12/9		2:26/12	3:63/25	1:36/6	
Engine (Internal Combustion).....	6:120/8	6:237/9		1:34/12			
Lettering and Symbols.....							3:46/8
Safety and First Aid.....	2:8/8		6:24/16	1:1/12	3:16/25		
Storage Batteries.....	3:36/8	3:22/9	5:41/16	2:34/12			
Tools and Equipment.....	4:41/8	1:4/9				1:34/6	5:77/8
Projects and Problems.....							
Related Information.....	1:2/10	6:127/9	8:113/16	3:19/12	8:646/25		
Economics.....	3:8/8		3:7/16		4:24/25		
Geography and Transportation.....	1:2/8				3:23/25		
History and Biography.....	3:8/8	2:11/9	4:19/16		3:15/25		
Mathematics.....	2:12/8		3:8/16		3:20/25		
Science.....	4:25/8		8:54/16		6:250/25		
Social Economics.....			1:9/16	3:19/12			
Trade Information.....	4:26/8	3:84/9	5:37/16		6:241/25		

TABLE XLVI (Continued)

MACHINE SHOP	MECHANICAL DRAWING		METAL WORK	PRINTING	WOODWORK		Total
	Jr. H. S.	Sr. H. S.	Jr. H. S.		Jr. H. S.	Sr. H. S.	
(Col. 9)	(Col. 10)	(Col. 11)	(Col. 12)	(Col. 13)	(Col. 14)	(Col. 15)	
Blue Printing and Tracing.....	4: 58/14	5: 24/11	8: 45/27		11: 126/31	7: 503/25	15: 104/223
Drawing and Design.....						1: 13/25	38: 819/223
Engine (Internal Combustion)...	7: 52/14	8: 83/11					14: 404/223
Lettering and Symbols.....			6: 37/27	1: 8/8	7: 64/31	4: 205/25	18: 181/223
Safety and First Aid.							31: 383/223
Storage Batteries							13: 133/223
Tools and Equipment.	4: 90/14	5: 40/11			16: 502/31	6: 391/25	35: 1214/223
Projects and Problems		3: 38/11	14: 812/27	3: 47/8	22: 456/31	9: 299/25	54: 1176/223
Related Information.....					29: 1283/31	14: 1095/25	102: 4540/223
Economics.....			5: 16/27		4: 18/31		19: 73/223
Geography and Transportation ..			3: 10/27		3: 10/31		10: 45/223
History and Biography.....			7: 33/27	2: 8/8	4: 54/31		25: 148/223
Mathematics			6: 31/27		9: 62/31	3: 115/25	26: 248/223
Science			8: 49/27		3: 17/31	3: 311/25	32: 706/223
Social Economic.....				1: 5/8		2: 262/25	7: 295/223
Trade Information			7: 77/27	4: 23/8	12: 98/31		41: 586/223

representative of course of study construction throughout the entire country, we may say that industrial arts recognizes *related information* from various areas as constituting a real part of its program. The topics "Drawing and Design" and "Safety and First Aid" occur in nine of the fifteen areas. In certain of these areas, however, *drawing* is treated independent of *design*, and *safety* is treated independent of *first aid*. Seven of the areas include the topics "History and Biography" and "Trade Information." The latter topic includes vocational information and a study of occupations. These two topics, however, appear in most of the courses of study under the classification *related information*.

Four of the fifteen areas include the topics "Tools and Equipment," "Projects and Problems," "Mathematics," and "Science." The last two items are frequently included under *related information*. "Blueprinting and Tracing," "Internal Combustion Engine," "Lettering and Symbols," "Storage Batteries," "Geography and Transportation," and "Social-Economics" topics are found in four of the fifteen areas. The last two topics also are frequently classified under *related information*. Twenty topics are found in three of the fifteen areas, while sixty-one are found in two of the subject areas. One area has 190 topics.

"Avocational Construction," "Freehand Sketch," "Home Mechanics," "Home Workshop," "Experimental Construction," "Consumer Knowledge," and "Trips" appear as topics very infrequently in the different areas. In the light of present-day interpretations of the functions of the school, it would seem that these topics merit more extensive treatment.

CONCLUSIONS

A dynamic society needs institutions capable of modification in response to changing values and new truths. Education in such a society is challenged to interpret and define its function. Recent thought and experimentation suggest that invoice should be taken of the various phases of the school program in use today to ascertain whether changes need to be made for a more effective and efficient performance of the functions for which this program is maintained. If changes are found to be desirable, their direction must be determined, and definite planning must be undertaken in order that new goals may be reached.

The discussion of the analysis of courses of study as it is presented

in this chapter reveals a need for clarification of many issues vital to the field of industrial arts and vocational education, and has implied that if certain changes were made the program would be better adapted to the present needs of the pupil. Some of these changes are:

1. The subject generally referred to as Industrial Arts, as it is presented in many courses of study, fails to make a clear distinction between two functions—training for specific trades and offering general education. Many of these courses are trying to perform both functions by using a single program. The question of the relationship of these functions and of the best method of organizing courses to integrate their functions is now being discussed by many leaders in the field. Carl A. Jessen recently stated:

... the term vocational registrations has included both those pupils who take the subjects for a definite vocational purpose and those who take some sewing or woodwork or agriculture with no intention of ever securing employment in such vocations. Both viewpoints are, of course, recognized as valid, since the parent who wishes his son to take a course in woodwork in order that he may develop desirable attitudes, understandings, appreciations, and avocational interests has, it would seem, reasons no less sound than the parent who advises his boy to take woodwork in order that he may become a carpenter. Still the woodwork courses offered these two boys should be vastly different and in practice usually are noticeably dissimilar.²²

From the data included in the foregoing analysis, it would seem that the statement that "[the courses] in practice usually are noticeably dissimilar" is not borne out by the evidence.

In a recent publication, Miss Bess Goodykoontz, Assistant Commissioner of Education, states her point of view in this connection:

The public schools, through the grades, should be rich in provisions for pupil experiences (1) which teach the necessity and dignity of work; (2) which illustrate the diversification of industry; (3) which provide for testing personal interests and aptitudes in representative crafts; (4) which serve avocational interests in construction; (5) which develop consumer knowledges and appreciations; (6) which provide occupational training for those who plan to enter employment as industrial workers and for those now in manufacturing trades who desire to improve their proficiency. The first five of these points are served by industrial arts as a phase of the general education desirable for all; the sixth point is the function of industrial or trade education

²² Carl A. Jessen, Senior Specialist in Secondary Education, U. S. Bureau of Education. "Registrations in Vocational Subjects." *School Life*, Vol. 23, p. 87, November, 1937.

for those who need it as specific training. Industrial arts merges into trade preparation at the time when general educational objectives change to specific training objectives.²³

While this problem concerning the function of industrial arts is by no means solved, considerable evidence points toward the possibility that industrial arts education has two aspects, each with definite and justifiable, but distinctly different, functions.

a. One aspect is *industrial, vocational, or trade training* and may be defined as specific training for entrance into or advancement in a specific trade or occupation. Its contents should be determined by the needs of the trade at the time the student is actually to enter upon the job. The many unanswered questions involved indicate that this aspect is important. Many experiments have been made; for example, such large-scale attempts as the Smith-Hughes Act and the subsequent federal enactments providing subsidies for educational work. Considerably more research, however, is needed.

b. The other aspect is conceived of as *general education*, without regard for preparation for a specific goal other than happy and useful living. Industrial arts considered in this light—as an opportunity program—offers the individual the opportunity to discover new meanings, to experiment with the application of knowledge to materials, and to find new powers within himself. It holds for participants a first-hand venture into cultural living, and provides satisfying experiences. Some interesting experimentation along these lines is being attempted in a few schools. Further experimentation is needed. Methods of selecting and organizing content for a program in industrial arts directed toward new goals have been suggested earlier in this chapter. Cogent argument, in terms of functions of education, may be advanced to show the desirability of such a program. To provide adequately for wholesome individual growth and development, our schools should give greater attention to the means by which industrial arts can contribute most abundantly to the joy and enrichment of life.

2. The analysis of trades or industries would seem to be the basis for the selection of the major part of the content in most of the courses examined. In only a small percentage of the courses does the content seem to have been selected on the basis of the analysis of general adult needs. Practically no courses give evidence that present pupil needs

²³ Goodykoontz, Bess. *Industrial Arts, Its Interpretation in American Schools*, Foreword. Bulletin 1937, No. 34, U. S. Bureau of Education.

influence to any great extent the selection of the topics included in the course.

3. Units in specific shop subjects associated with trades, such as woodwork, printing, or sheet metal work, form the pattern on which the content of industrial arts is organized. The use of the word "general" as part of the title of shop subjects is in vogue, but little evidence was found to show that it has seriously influenced the basic approach to the selection of content.

4. In the main the internal organization of industrial arts is formal, and the content is presented either in terms of specific skills, processes, and information, or in terms of specific projects. Little evidence was found that learners could make a functional application of the items of content to problems, nor was there much evidence of provision for adjustments in recognition of the vast differences known to exist among pupils.

5. Inspection of the courses of study from many different schools reveals a wide diversity of content included under courses having the same title.

6. Auto mechanics courses show that little attention has been given to the needs of the large group of pupils who are or will become operators of motor vehicles. These courses reveal a program of specific preparation designed to meet the needs of those entering the auto mechanics trade.

7. Bell work, wiring, and measuring appear frequently in the content of courses of study in electricity. Very little attention is given to radio, although millions of radios are owned in this country.

8. Junior high school general shop consists mainly of woodwork and electricity, with some work in mechanical drawing and sheet metal indicated. In most schools the course appears to be limited in scope; but this is not true of every school.

9. Household mechanics shows a wide variety of treatment and indicates a program more nearly approaching the practical future needs of the pupils than any other shop subject studied here. Reports show that such courses as "handicrafts" are making an effort to serve the present needs of the pupil, and are considered satisfactory from this standpoint. No courses of study of this kind, however, were available for this investigation.

10. A strong emphasis upon the development of technique is found in Mechanical Drawing. Acquisition of techniques appears to be the

end value in many of the courses and there is little evidence that techniques are taught in these courses as means to an end. Application of techniques to problems that appear vital to the student is conspicuous by its absence. Very little emphasis seems to be placed upon the interpretation of drawings.

11. The analysis of courses in metal work shows that this subject is chiefly concerned with the processes, informations, and skills having to do with the sheet metal, art metal, and bench metal trades.

12. Related information seems to be an important part of many of the courses. In junior high school Woodwork, for example, one-third of the items in the courses come under this classification. Often the materials included are items related to other school subjects, such as mathematics, science, history, and economics.

13. Safety and first aid are very infrequently found as topics in the courses of study. Safety as a topic showed a startling scarcity, even in courses involving the use of power machinery.

14. The use of predetermined subject matter is common to most of the courses, which are designed to teach a specific amount and kind of subject matter usually defined in terms of techniques or information. Few, if any, of the courses show an organization of content which is centered around the pupil, recognizing his present needs or satisfying his present interests.

15. Little opportunity for creative expression, experimentation, and pupil-selected activities, engaged in for sheer joy of participation, appears to be provided by most of the courses analyzed. A certain amount of freedom would seem necessary if the student is to discover and develop his practical and creative abilities.

16. Highly specialized courses are predominant. Few courses among those analyzed show an organization where the majority of pupils could work upon general applied art and general construction problems.

17. In some instances attempts have been made to develop relationships between the content of industrial arts and that of other subjects taught in the school. In the courses of study examined, these attempts usually appear as items under the heading "related information." From the point of view of correlation and integration, there seem to be many opportunities in the industrial arts to contribute to a more broadly conceived program of education.

CHAPTER VI

Some Suggestions and Conclusions Emerging from This Study

IN Chapter I there were presented arguments concerning the need for the present study together with its purposes. In Chapter II the techniques utilized in the study were discussed in detail. In Chapters III, IV, and V consideration was given to an interpretation of the analysis of courses of study in science, social studies, and industrial arts. In the present chapter a brief presentation is made of the frequency with which certain topics appear in more than one subject matter field (Transportation and Clothing are used as illustrations). In addition, certain trends in the organization of the curriculum and in curriculum content, both favorable and unfavorable, are presented.

THE TOPIC TRANSPORTATION

On page 196 is reproduced a master index card for the topic Transportation, showing the indexes of significance for this topic for eight subject matter fields from grade 4 to grade 12 inclusive. As was explained in the preceding chapters, the denominator of the artificial fraction, called the index of significance, indicates the number of courses examined. The figure at the left of the colon in the numerator indicates the number of major units or topics devoted to the topic under consideration, in this case Transportation, and the figure at the right indicates the number of times the topic was mentioned or the frequency with which the major topic or any of its items was mentioned in the courses of study. For example, three of the eight art courses of study examined in grade 4 include transportation as a unit or major topic, and transportation or one of its subheadings was mentioned as an item four times in the three courses. Under the column at the extreme right in the master index card, headed "Total," are the summary indexes of significance showing the number of courses treating transportation, the number of items referring to transporta-

MASTER INDEX CARD FOR TRANSPORTATION

	4	5	6	7	8	9	10	11	12	Total
Art	$\frac{3.4}{8}$	$\frac{3.3}{8}$	$\frac{2.2}{8}$	$\frac{1.1}{15}$	$\frac{0.0}{11}$	$\frac{0.0}{13}$		$\frac{1.2}{48}$		$\frac{10.12}{111}$
Business Education					$\frac{16.1077}{19}$			$\frac{8.460^*}{26}$		$\frac{24.1537}{45}$
Health	$\frac{0.0}{20}$	$\frac{0.0}{24}$	$\frac{0.0}{18}$	$\frac{7.76}{12}$	$\frac{6.103}{13}$		$\frac{3.42^1}{9}$			$\frac{16.221}{96}$
Home Economics				$\frac{0.0}{19}$	$\frac{0.0}{20}$	$\frac{0.0}{17}$	$\frac{0.0}{19}$	$\frac{0.0}{19}$	$\frac{0.0}{14}$	$\frac{0.0}{115}$ 7 H. S.
Industrial Education					$\frac{3.23^{**}}{127}$			$\frac{0.0^{***}}{96}$		$\frac{3.23}{223}$
Language Arts					$\frac{11.351}{32}$	$\frac{2.37}{25}$	English Lit.	Amer. Lit.		$\frac{14.419}{75}$
Science	$\frac{0.0}{15}$	$\frac{0.0}{15}$	$\frac{0.0}{12}$	$\frac{3.11}{18}$	$\frac{4.101}{22}$	$\frac{7.253}{22}$	Biology	Chemistry	Physics	$\frac{16.379}{133}$
Social Studies	$\frac{8.351}{40}$	$\frac{15.1088}{41}$	$\frac{10.633}{39}$	$\frac{8.521}{31}$	$\frac{15.696}{31}$	$\frac{7.370}{15}$	W. Hist. ²	Am. Hist. ²	M. Prob. ²	$\frac{85.4146}{277}$
							$\frac{0.0}{23}$	$\frac{1.9}{14}$	$\frac{21.478}{43}$	$\frac{168.6737}{1075}$

* Business Education—Senior High School: Business Education, Commercial Law, Advertising Sales.

** Industrial Education—Junior High School: General Shop, Auto Mechanics, Art Metal Work, Mechanical Drawing, Household Mechanics, Electricity, and Woodwork.

*** Industrial Education—Senior High School: Auto Mechanics, Architectural Drawing, Electricity, Machine Drawing, Machine Shop, Printing, and Woodwork.

¹ In some instances, these courses cover all three years, while others cover only two or one.² All World History courses were charted in the tenth grade, all American History in the eleventh grade, and all Modern Problems in the twelfth grade, since this was the scheme that was almost universally followed by the schools. Since there are some exceptions to this (for example, Modern Problems is taught in some schools in the eleventh grade), the percentages for transportation would differ slightly from those indicated on the chart.

Mathematics courses have not been included in this chart.

tion, and the total number of courses examined in each subject field. For example, in art, ten of the 111 courses examined include transportation as a unit or major topic, and a total of twelve items referring to that subject was found.

In business education and social studies, however, there is quite a different story. Transportation appears as a major topic in more than half of the business education courses examined for a total of 1,537 items, and in approximately a third of the social studies courses for a concentrated total of 4,146 items. As might be expected, it does not appear at all as a major unit in home economics, and its occurrence is negligible in industrial arts.

These facts are brought out vividly in Graphs II and III. Graph II indicates the per cent of courses in each field which treat transportation as a major topic. It will be noted that 53.3% of business education courses and 30.7% of social studies courses include transportation as a major topic. It is interesting to find that 18.7% of language arts courses use transportation as a major topic or as a springboard for the introduction of the teaching and learning of English forms. It is rather surprising that 16.6% of health courses use transportation as a major unit—mainly in the safety sections of the courses. On the other hand, only 12% of the science courses utilize transportation as a major topic. This is lower than expected. The percentage of art courses treating transportation is higher (9%), and the 1.3% of industrial arts courses is lower than expected.

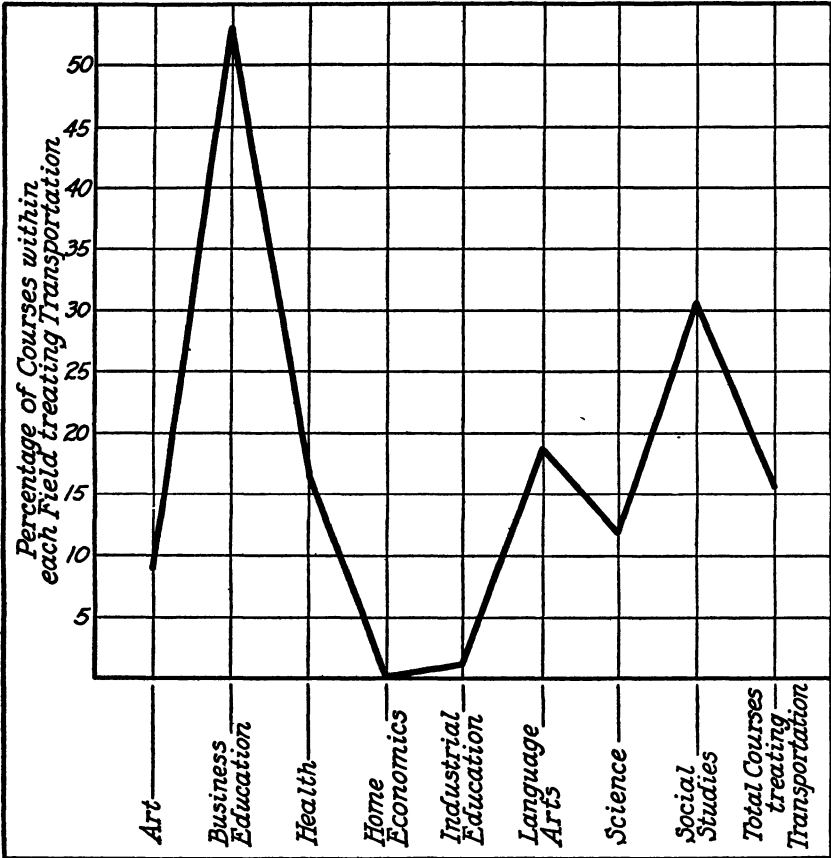
The relative density or concentration of items (major units, topics, or subtopics) mentioning transportation is indicated in Graph III. Of all courses treating transportation, those in business education lead in frequency of mention—64 times per course. The large frequency of mention in business education is due to the fact that many courses include a treatment of the business forms that have to do with travel, such as letters of credit and travelers' cheques. Social studies is next, with 48.8 items mentioned per course. Next in order come language arts and science, with 29.9 and 23.7 items respectively, health with 14, industrial arts with 8, art with 1.2, and home economics with none.

The broken line in the graph indicates the number of transportation items per course in each of the fields.* Again it is evident that one can expect far more frequent mention of transportation and travel in business education than in other fields. Social studies again ranks

* Based on the average number of transportation items per course when all the courses utilized in the study were considered.

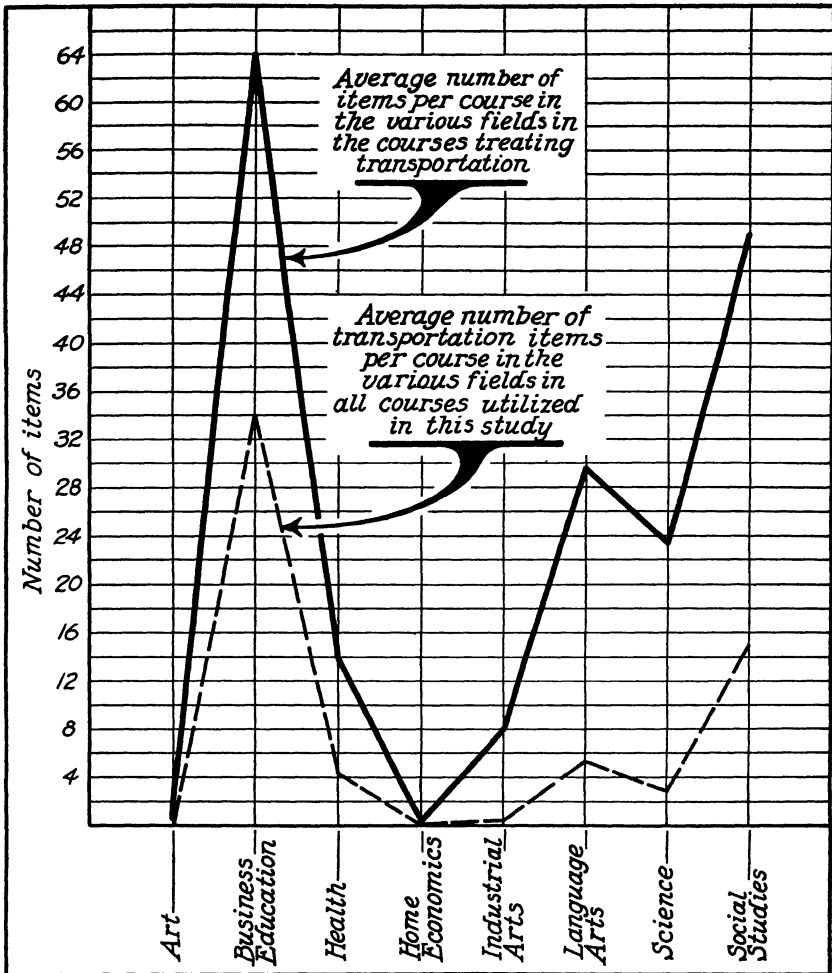
GRAPH II

Percentage of Courses Within Each Field Treating Transportation

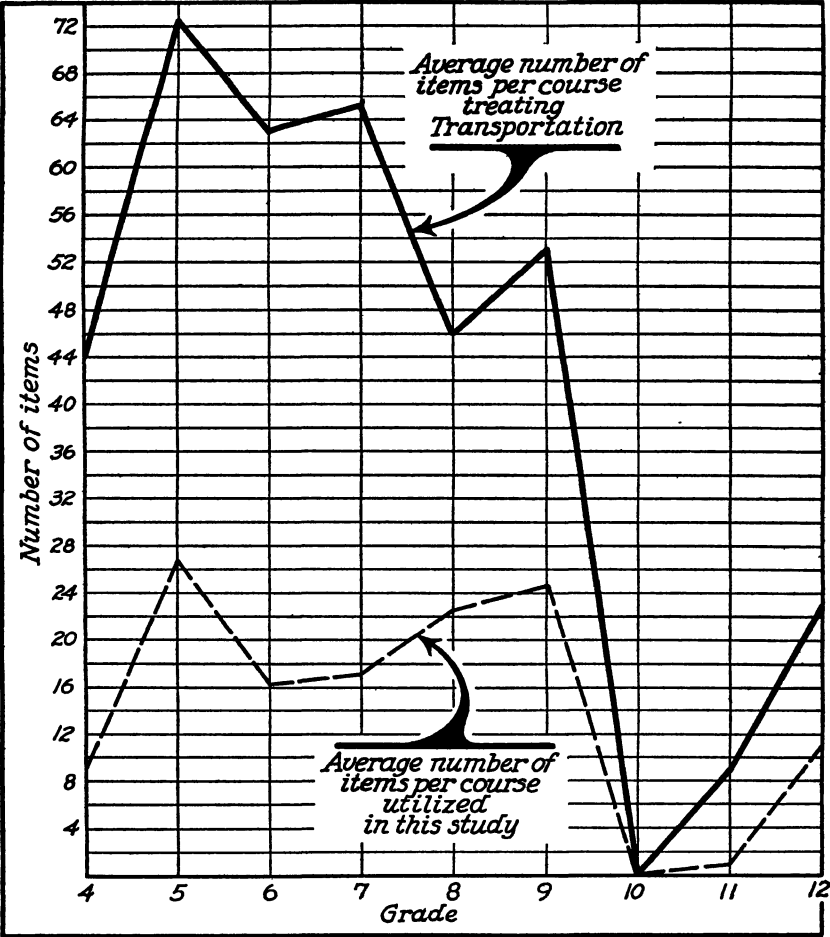


GRAPH III

Average Number of Transportation Items per Course by Subject Field



GRAPH IV
Average Number of Transportation Items per Course by Grades



MASTER INDEX CARD FOR CLOTHING

	4	5	6	7	8	9	10	11	12	
Art	$\frac{3:3}{8}$	$\frac{2:2}{8}$	$\frac{1:1}{8}$	$\frac{3:6}{15}$	$\frac{0:0}{11}$	$\frac{0:0}{13}$		$\frac{1:1}{48}$		$\frac{10:13}{111}$
Business Education					$\frac{0:0}{19}$			$\frac{0:0}{26}$		$\frac{0:0}{45}$
Health	$\frac{13:67}{20}$	$\frac{11:138}{24}$	$\frac{7:61}{18}$	$\frac{4:101}{12}$	$\frac{4:37}{13}$			$\frac{3:39}{9}$		$\frac{42:443}{96}$
Home Economics				$\frac{15:3258}{19}$	$\frac{14:2061}{20}$	$\frac{15:4269}{17}$	$\frac{16:4249}{19}$	$\frac{19:3346}{19}$	$\frac{9:1321}{14}$	$\frac{7:752 \text{ Boys}}{7 \text{ H. S.}} \frac{95:19256}{115}$
Industrial Education					$\frac{0:0}{127}$			$\frac{0:0}{96}$		$\frac{0:0}{223}$
Language Arts					$\frac{0:0}{32}$	$\frac{0:0}{25}$	English Lit.	$\frac{0:0}{18}$		$\frac{0:0}{75}$
Science	$\frac{0:0}{15}$	$\frac{0:0}{15}$	$\frac{0:0}{12}$	$\frac{3:146}{18}$	$\frac{1:7}{22}$	$\frac{2:64}{22}$	Biology	$\frac{1:3}{12}$	Physics	$\frac{8:229}{133}$
Social Studies	$\frac{5:435}{40}$	$\frac{3:478}{41}$	$\frac{3:290}{39}$	$\frac{2:95}{31}$	$\frac{2:32}{31}$	$\frac{0:0}{15}$	W. Hist.	Am. Hist.	M. Prob.	$\frac{16:1369}{277}$
							$\frac{0:0}{23}$	$\frac{0:0}{14}$	$\frac{1:39}{43}$	$\frac{171:21310}{1075}$

Mathematics courses have not been included on this card.

second. The most interesting feature here is that fewer mentions of transportation by far appear in the other fields per course than is indicated in the heavy line. This means that, particularly in the fields of science, language arts, health, and industrial arts, one may expect to find many courses that do not mention transportation at all, even though a few courses in these areas mention it many times.

The relative density or concentration of transportation items (major unit, topics, or subtopics) by grade levels is indicated in Graph IV.

Master index cards have been prepared for a number of major topics. The one for Clothing appears on page 201.

Transportation as a Topic in the Elementary Grades

From the master index card it is evident that in the elementary grades practically the entire treatment of the topic "Transportation" is in the field of the social studies. This treatment is concerned with the early history of transportation, the development of roads and wheels, and the effect of transportation upon the development of civilization. Large sections of courses of study are devoted to the development of transportation in the United States—railroads, waterways, highways, and airways. The effect of the Westward Movement on the development of transportation is emphasized in most of the courses. Unfortunately, the effect of the expansion of transportation on industry and on living and social conditions in the United States is mentioned in very few courses, but those courses which do mention this effect contain very promising material—especially that dealing with some of the problems created by the progress of transportation. Some courses, particularly those in geography, treat the effect of climate and geographical features upon transportation.

Transportation as a Topic in the Junior High School

In the junior high school, we find transportation treated not only in social studies but in business education, science, language arts, health, and industrial arts as well. One course in art mentions it once. The social studies units on transportation are much the same as these units in the elementary grades, except that here the treatment is not limited to the United States but covers world trade routes, navigable rivers of the world, and seaports throughout the world. The problem of making rivers navigable is treated in some

courses, as is also the study of canals and the Great Lakes waterways.

More extensive consideration is given to railroads, raising such questions as who builds and operates railroads, what effect railroads have had on the population and settlement of the country, how they have tended to make the Union stronger, and, in an encouraging number of courses, their effect on the farmer, food supply, and industrial centers. Rather extensive sections, too, are devoted to air transportation; these include pioneers in the invention and piloting of planes, the mapping of air routes over the world, and famous flights. In many of the junior high school social studies courses the theme of how transportation increases economic interdependence is evident.

The types of highways, bridges, etc., that are being built, materials used, methods employed, cost, and means of financing are discussed in many courses, as are problems presented by the coming of motor travel, such as traffic regulations, licensing, parking regulations, etc. What the government has done in relation to these problems is another phase of transportation that is studied. Some of the courses also contain sections on travel and shipping information.

A few of the courses discuss vocational opportunities afforded by transportation, and cite figures on the number of people employed in transportation industries.

The junior high school science courses deal with such topics as methods and use of transportation, electricity and the engine in transportation, and the effect of transportation progress on modern life.

In the language arts, transportation or some phase of it is used either as a center of interest in literature courses or as a unit of material through which various English skills are developed.

In health and physical education practically the entire treatment of transportation is in connection with safety and first aid.

In business education, as was noted before, transportation is treated quite extensively and usually appears in two types of units—travel services and transportation of goods. In units on travel services, such topics as these are studied—railroad, motor, air, water, and foreign travel, together with the classes of service available for each and the means of obtaining these services, etc. In addition, there are included such topics as tours, travel insurance, carrying money when traveling, hotels, tourist homes, and laws involved in travel services.

In the sections on the transportation of goods, such transportation

services as parcel post, express, freight, motor truck, water, and air are studied. The legal aspects are emphasized in some courses. It is interesting to note that sixteen of the nineteen courses in junior business training give major emphasis to transportation.

Transportation as a Topic in the Senior High School

Transportation as a topic receives far less treatment in the senior high school than in the junior high school, except in the modern problems courses of the social studies and the negligible case of two mentions in one course in art. This is due to the fact that in the field of social studies, American and world history are taught rather universally in grades 10 and 11; in science, the more or less formal subjects of biology, chemistry, and physics appear in most courses; and, in business education, the subjects of stenography, bookkeeping, typing, and commercial law are stressed. This is a rather striking illustration of the fact that the traditional curriculum is continued in most of our senior high schools and therefore modern social problems such as transportation are excluded. The outstanding exception is to be found in the modern problems courses of the social studies which include such topics as the effect of war, of immigration, and of communication on the development of transportation, the development of the automobile and its effect on American life, changes in freight transportation regulations due to the development of the motor truck, government regulations in connection with transportation problems, the cost, financing, and management of railroads and the possible relationship of the government to them. Harbors, navigable rivers, possibilities of making more rivers navigable, foreign trade in relation to waterways, public utilities and problems connected with their operation, and the need of efficient transportation in the United States are also considered. No one can compare the materials offered in courses in modern problems with those presented in many of the more traditional fields of the senior high school without sensing the great difference between the two and seeing the far more promising possibilities presented by the former.

CURRICULUM TRENDS

In formulating the statements of these trends, the authors have drawn not only on the data utilized in this report but on their ex-

perience in evaluating teaching and learning materials, which, in some instances, has extended over a number of years. Some of these trends are quite obvious; others are just emerging. Some, it is true, may be merely spasmodic or temporary changes in point of view, content, or organization, rather than actual trends. These trends will be described in the following paragraphs.

Trends in Organization

Perhaps the most significant trend in the entire curriculum improvement movement lies in the attempt to find new patterns of organization for materials and experiences. While this trend to find new bottles, if not new wine, is indicated in many instances throughout this study, one is forced to the conclusion that in most cases the content remains more or less the same. Eight patterns of curriculum organization are discussed in the social studies chapter of this study. These range from discrete bits of adult selected subject matter which is supposed to be utilized by the pupils later in adult living, to unbridled and unevaluated immediate pupil interests. Some of these patterns hold more promise than others, in point of view or philosophy, in organization, and in content.

The most outstanding trends concerned with organization are the following:

- (1) An increasing amount of attention is being given to the effective organization of content to promote better teaching and more functional learning. This is evidenced by the large number of courses which deviate, particularly in some respects, from traditional patterns of organization, and by the variety of patterns found. Although it is true that the majority of courses still reveal no significant change in organization from the traditional separate subject matter point of view, the rapidly increasing number of courses, particularly in the last decade, that attempt more functional organization marks a distinctive and desirable trend. It must be pointed out, however, that some of the efforts toward reorganization are disappointing, in that the writers of the courses seem to have made a fetish of organization as such and have emphasized it to the neglect of the discovery and inclusion of new and desirable content. In addition, there is evidence, unfortunately, of an absence of experimentation with different forms of organization within any one school system. In many cases it appears that if a community, state, or section of the country has

selected a particular pattern of organization, experimentation with organization ceases or becomes concentrated within a single pattern. In the absence of convincing evidence of the superiority of any one pattern, it would seem inadvisable to block educational progress by freezing procedures and materials into one pattern without sufficient experimentation. On the other hand, the value of working with one plan for a sufficient length of time to determine its effectiveness is undeniable.

(2) The attempt to make the living of pupils more functional through organization around themes, processes, centers of interest, and problems rather than around subject matter as such represents a definite trend and one which is in a desirable direction. This trend, which actually began around 1930, is developing rapidly, as is indicated by a comparison of the courses of study received in 1940 and 1941 with those received five and ten years earlier. Unhappily, some of these courses, even though they represent for the most part the best available, seem to have been based on criteria for the selection and organization of content which basically are identical with those utilized in traditional patterns. This is lamentable, especially when one considers the freedom some of these schools are known to enjoy. Nevertheless, the trend toward functional organization has been so marked and the net results have been so superior that in all probability it will continue to develop rapidly in both scope and quality.

(3) There is increasing evidence that pupils are participating more than ever before in selecting their curriculum experiences and in determining the way in which they are to be organized. This is a corollary of (2) above, but it deserves special mention because it indicates greater emphasis on the actual needs and interests of the learner. While evidences of this trend are not numerous, the courses in which it appears come from communities which have had considerable influence on curriculum practices in the past and probably will have in the future.

(4) Specialized content is beginning to be more frequently approached through general or survey courses or through its correlation with other content. This trend probably reflects the influence of the organismic concept of learning. The number of instances of such organization is comparatively small, but it is sufficient to be regarded as indicating a trend.

(5) Teaching and learning materials appear in the form of study

guides, source materials, aids to learning, units of instruction, and the like. These come in increasing amounts from schools which are not restricted by prescribed courses of study, examinations, and regulations. This trend is indeed forward looking. In fact, the authors believe that it would be highly desirable if the term "course of study," with many of its connotations of prescription, should disappear entirely and some such term as "learning and teaching materials," "enriched materials," or "source materials" be employed instead. The term "course of study" once meant almost what it said. The course was laid out and woe be to him who failed to follow it. All too often this same attitude still continues to prevail. If curriculum improvement is to progress further, it is mandatory that educators continue to develop learning and teaching materials, and it is equally mandatory that these materials be in such form that they can be utilized by and adjusted to the needs of each individual and each group. Unfortunately, some of our ultra-progressive educators, in their laudable desire to preserve the freedom of each individual and group to formulate or to choose the materials needed, have made the error of insisting that no course of study or teaching and learning materials are necessary except those developed "on the spot" by the individual teacher and pupils. The experiences of especially able teachers and pupils, working under the most favorable conditions, will always be of value as a guide to other teachers and pupils.

Trends in Content

One of the major findings emerging from the examination of these courses of study is that there is a great dearth of the kind of new content which is needed in our times. The new material that does appear, however, is, in the main, better suited to current needs, and may be the forerunner of increased volume of similar content in the future.

In introducing new material three methods have usually been employed:

- (1) Complete new courses, such as household mechanics and home economics for boys, have been instituted to meet new needs.

- (2) In such courses as general mathematics and general science new material has been combined with the material selected from older courses, but with aims, organization, and content quite different.

- (3) New material has been added to certain older courses which remain basically the same.

Some of the trends in relation to curriculum content are as follows:

(1) Realization of the need for new material is becoming evident. Suggestions to teachers that they supplement the regular course with new and additional material is found more and more frequently—in fact, far more often than is the new material itself.

(2) The influence of the activity movement is apparent in the large number of courses which list numerous activities. These activities or experiences frequently involve additional subject matter content either by specific description or by implication. In many cases, however, the activities and experiences seem to be merely addenda appended in an effort to rejuvenate a more formal academic outline of content.

(3) Happily, much of the new material suggested is in the field of modern social problems, such as transportation and communication, conservation of natural resources and industries. Unhappily, some areas of tremendous importance, such as housing, cooperatives, and employment, are not generally treated. The fact that they are being introduced in many of the best courses, however, would indicate that treatment of these and other problems of similar importance is undoubtedly gaining favor.

(4) An increasing number of courses are including suggestions for adaptation to local needs and include local materials together with suggestions on how these may be utilized most effectively. This is a most desirable trend. It is in harmony with the sound thesis that education, if it is to be vital, must concern itself with the needs and interests of the community in which it is being conducted.

(5) An effort is being made in a few courses to provide materials better adapted to the maturity levels of the pupils and more closely related to their individual needs and interests. Some recent courses base their materials on “interest” studies. In others, materials such as spelling words, arithmetic problems, and social studies reports are chosen by the pupils themselves.

(6) Certain courses, especially in the arts, are increasingly recognizing consumer values and are giving more emphasis to appreciation and use. Skills are treated for their value in increasing appreciation of art rather than in developing producers of art.

(7) There is some evidence that the subject matter in science, once considered static, is being modified and amplified in keeping with the general trend in scientific thinking and practice of today. Much more should be done in this direction.

In spite of the favorable trends listed above the following significant facts remain:

(1) There is a persistent attempt in the majority of courses to utilize traditional subject matter to satisfy new needs.

(2) Part of the new content that has been introduced is in many instances not significant. It is as academic as is the remainder of the course. For example, one unit on installment buying devotes a major portion of its emphasis to the skills needed to calculate the interest paid and gives little consideration to the social and personal problems involved. A unit on forms of government lists dictatorships without reference to the present world crisis.

(3) Some of the new material does not provide for a sufficiently thorough analysis of the problem involved. Like many other innovations, some of the material seems to have been introduced merely because it was novel.

(4) There are glaring shortages in content in certain fields. For example, in science, there is almost no mention of practical science in industry, in the home, or with reference to the consumer. In social studies there is little or no mention of advertising and its widespread influence, art, child labor, housing, insurance, installment buying and consumer education, social security, dictatorships, and many other vital problems today. In industrial arts, there is only slight mention of household repair jobs, of the social implications of the new uses developed for old materials and the new materials developed, of new tools and new industries.

(5) The underlying philosophy of many of these courses prevents the content from assuming full significance. For example, the idea that science should remain "pure" stultifies the social emphases that might otherwise be present. Similarly, the notion that social studies should at all times maintain unity, sequence, and chronology often militates against its functional interpretation and use.

The purpose of the present study has been to take inventory of what is taught in the schools as far as this can be done by analyzing, as objectively as possible, the content of courses of study. Unfortunately, it has been practicable to present in this volume only a small part of the data available. The half-million topic cards, the 1,175 detailed outlines of courses of study, the unit-topic charts in the fifty-nine subject and grade areas, such as social studies for the fifth grade, the master unit-topic charts for nine subject matter fields, and the

master index cards prepared for a few selected topics are being used widely at the present time in the preparation of certain curriculum materials. It is hoped that they will be utilized much more widely in the future in determining and interpreting the content in each of the various fields and grades of the school, in discovering and interpreting trends, and in making suggestions for the improvement of present teaching and learning materials generally. The reader is warned again not to attempt to draw exact statistical conclusions from the data presented since it was impossible to weight accurately the various items, as, for example, an item in social studies in the fifth grade against one in the sixth grade. Nevertheless, the authors feel that the materials have been analyzed with such care at every stage in Chapter II that the results presented approximate at least grossly the frequency of mention of the various topics existing in the courses of study examined.

Many will question the value of a study which attempts to analyze present conditions and does not give major attention to the problems involved in looking ahead. The chief reason for conducting the present study was to provide an analysis of what now exists in the schools which might serve as a definite starting point for any suggestions as to what the content should be in the future.

While any informed educator is thoroughly aware of the fact that considerable change is needed in the content and conduct of our learning and teaching processes in the American public schools, he is equally aware of the dangers involved in introducing too suddenly innovations which are not based on a careful study of present conditions. In no sense, however, should studies such as this be considered a plea to adhere to the status quo. It is hoped that the present investigation may be of assistance to teachers, administrators, textbook writers, and others in planning genuine improvements based upon more accurate knowledge of what actually exists.

In the Appendix are presented (1) the criteria (with a few minor changes to bring them up to date) utilized in rating the courses of study which formed the raw data in the present study, and (2) some general principles for planning and operating a curriculum laboratory or workshop. These are included for what they may be worth to others who find need to rate teaching and learning materials and practices or who are planning to set up or are already operating curriculum laboratories or workshops.

APPENDIX I

Criteria for Evaluating Teaching and Learning Materials and Practices

I. Philosophy

A. SOCIAL PHILOSOPHY

The social philosophy of the schools should be one which will be most effective in forwarding the ultimate aims of our American democracy. It should recognize the dynamic character of society and should demand that the school be an active, conscious agent for social improvement.

1. Is the desirable society conceived of as a democracy?
2. Is it recognized that institutions should be continually modified as new situations demand and as we achieve better insights and understandings?
3. Is living conceived of as a process of making adequate adjustments to a dynamic world?
4. Is social life considered necessary for the fullest expression of the individual?
5. Is there a recognition of life's conflicting forces and issues, and have provisions been made to deal with them realistically?
6. Is the school recognized as a conscious agency for social improvement?

B. EDUCATIONAL PHILOSOPHY

The educational philosophy should be based upon the social philosophy and should be the dominating force in determining the character of the work or materials. The chief aim of education should be to assist individuals to become increasingly self-directive in improving our American living through satisfying individual growth.

1. Is the curriculum thought of as including all the activities of pupils (both in and out of school) over which the school exercises a directing influence?

* These criteria are general in nature. Subject matter specialists, when judging material and practices, will need to make appropriate applications.

2. Is significance attached to relationships existing between the pupil and his environment?
3. Is the aim of education conceived of as the development in individuals of the ability to direct intelligently their own thinking in regard to their betterment and the improvement of society?
4. Is significance attached to the fact that people are important environmental factors in experience?
5. Is it recognized that the school should provide adequate opportunities for differentiated education to meet individual differences in attitudes, interests, understandings, abilities, needs, and skills?
6. Is the course of study considered a suggestive guide rather than a rigid outline of materials to be taught?

C. PRINCIPLES OF LEARNING

The materials and work should be consistently based on the soundest principles of psychology.

1. Is each new learning act considered to be in some degree re-making the whole organism?
2. Is self-activity considered fundamental to learning?
3. Is study conceived of as an attack upon the situation—is the attitude that “what is learned is learned as and because it is needed for the control of this situation”?
4. Are provisions made for taking into consideration the underlying principles of integration?
5. Are the activities and materials organized into patterns which, if used, assist in the better growing of the individual?
6. Is the position held that the learner should experience satisfaction from engaging in activities?
7. Is knowledge considered a means to enable the individual to participate more effectively in life situations?
8. Is significance attached to pupil meanings and insights?
9. Is the view held that growth and learning are continuous throughout the life of the individual?
10. Is there provision for making the situations of the school real?

II. Activities

A. APPROACH

The approach to any series of experiences or areas of work should so challenge every member of the group that each has a chosen desire

to initiate and carry to its conclusion the projects which the group has planned.

1. Is the approach sufficiently broad and flexible to include work that will challenge the interests and abilities of the group and of each individual?
2. Do the materials provide a dynamic approach which will lead to further challenging and accomplishing?
3. Is the suggested approach or approaches based upon the present needs, interests, and capacities of the group of which the teacher is the guiding member?

B. PUPIL PURPOSING

The activities should provide for the real purposing of the pupil, in order to stimulate in him the desire to proceed on his own initiative in planning, in assuming responsibilities, and in controlling to an ever-increasing extent and on continually higher levels (a) the experiences to be undergone, (b) the process of development, and (c) the evaluation of the results.

1. Do the activities provide for real purposing and planning which will stimulate in the pupil a desire to proceed on his own initiative?
2. Do the activities result from a problem-solving attitude on the part of the pupil?
3. Will the activities give opportunity for the pupil to assume responsibility and to control his experiences to an increasing degree?
4. Do the activities provide for a clarification of pupils' purposeful ideas through various mediums of creative expression, such as social activities, language, painting, drawing, modeling, dramatization, etc.?
5. Do the activities furnish adequate opportunities for practicing and developing valuable work and study habits needed in accomplishing pupil purposes?

C. INTERESTS AND NEEDS

The activities must be directed toward satisfying real needs, based upon promising interests, to the end that optimum growth may take place; hence these activities must be closely related to the present experiences of the pupil.

1. Are the activities so closely related to the pupil's present life

that his own interests will become the natural driving force in initiating and carrying the activities through?

2. Do the activities promote sensitivity on the part of the pupil to his own significant needs and problems?
3. Will the activities, if successfully carried through, result in satisfying present interests and needs and also in creating new and still more valuable interests?

D. SOCIAL VALUES

The activities must provide experiences which, by meeting the demands of an ever-changing dynamic society, will help the pupil to be a more valuable member of that society.

1. Are the activities concerned with persistent problems and areas of high social significance?
2. Will the activities contribute to the growth and development of ideals, attitudes, appreciations, knowledges, procedures, habits, and skills which are normally used by pupils in the important activities of life?
3. Do the activities provide opportunities for valuable social contacts?
4. Do the activities assist the pupil in realizing to a great degree the problems and work of others in making life socially effective?
5. Is provision made for the consideration of the opinions and suggestions of others?
6. Is provision made for the individual to seek assistance from the social group and for giving assistance to the social group when such help is desired or needed?
7. Is there an opportunity for experience in leading and in following?
8. Is provision made for raising the level of social behavior?

E. REALITY

There should be provided activities which are selected from real life situations and which are considered interesting and important by the pupil because he finds in them many opportunities to satisfy his needs.

1. Do the activities arise from real life situations?
2. Do they produce, as far as possible, actual life situations?
3. Are the life situations involved in the activities the most realistic that can be chosen and do they provide the greatest promise for growth in things that matter?

4. Do the activities provide opportunity for the development of the willingness and ability to face life situations realistically?

F. VARIETY

There should be sufficient variety of interesting desirable activities to provide for the kind of individual and social growth implied in the foregoing sections.

1. Is there a sufficient variety to provide adequately for pupil purposing and planning?
2. Is there a sufficient range of activities to provide adequately for the various interests and needs of the group?
3. Do the activities involve a sufficient range of significant social values for the members of the group?
4. Is there sufficient variety of activities to enable pupils to face realistically the problems involved?

G. CULMINATING ACTIVITY

The culminating activity should constitute a method by which the group and each member of the group realize the purposes which they have set for themselves. In so doing they will relate and put into the most valuable and meaningful use the ideas and materials employed during the entire period of work.

1. Has the culminating activity been planned by all the members of the group in the early part of the work?
2. Does it provide for the optimum and most meaningful use of the activities and materials utilized throughout the work?
3. Is it so set up that pupils and teachers have opportunity to appraise their own ability to understand, to appreciate, and to make functional use of the ideas, activities, and facts employed during the work?
4. Has it offered optimum opportunities for a sharing of the work according to the interests, needs, and abilities of each member of the group?

III. Content

A. AUTHENTICITY

The materials included should be accurate and authentic, based upon the most scholarly findings and concepts.

1. Are the materials based upon the soundest available primary and secondary source materials?
2. Do the reference materials include or suggest the most reliable primary and secondary sources for teacher and pupil?

B. UTILITY

The materials should be stated in such fashion that they can be utilized in the solution of life problems.

1. Will increasing understanding of the problems involved be crucial to most of the group using them?
2. Do the materials assist the pupil to develop and to foster a more critical sense of discrimination?
3. Are the data sufficient to arouse in the pupil a keen awareness of the need for problem-solving?
4. Do the materials help the pupil to see better his relations as a member of the group?
5. Will the materials help to broaden the social interests of the pupil?

C. ADEQUACY AND SIGNIFICANCE

The materials should be adequate and appropriate in the treatment of those areas of human activity which are most significant for the welfare of society and for the growth of the individual at his level of maturity.

1. Are the materials of everyday significance to society?
2. Is the content selected to meet the individual and social needs of the pupils?
3. Do the materials include the best thought, past and present, on the most significant and common human and social problems?
4. Do the materials help the pupil understand and exercise in a better way his privileges and responsibilities as a member of a group, thus broadening and stimulating his social interests?
5. Are the materials sufficiently challenging to take into account the needs and desires of each individual at the age and intelligence level considered?
6. Are the materials such that they will arouse in the pupils a keen awareness of the need for problem-solving?
7. Does the course of study suggest or include a sufficiently wide range of materials which may be useful in the development of problems or areas?

8. Is a sufficiently representative range of significant points of view regarding controversial issues included or suggested?
9. Do the materials provide adequately for the total present experiences of the pupil?
10. Does the course of study make adequate provision for the proper use of physical as well as academic materials?
11. Do the materials lend themselves to the securing of more or less intangible outcomes, such as appreciations, attitudes, and certain techniques?
12. Do the materials provide for various types of learning experiences, such as reading and creating?

D. ORGANIZATION

The material should be organized around major areas of experience so that the pupil may be assisted: (*a*) in discovering and developing promising immediate interests; (*b*) in identifying and satisfying those needs which have value; and (*c*) in securing an enriched experience.

1. Are the materials organized around broad areas of significant human experience?
2. Are the materials developed through the use of a few large and important problems?
3. Is each of the major problems developed through a series of carefully arranged consecutive minor problems?
4. Are the facts organized around related ideas, so that they may help in developing major understandings or generalizations?
5. Are the materials so organized that the pupils and teacher are permitted sufficient latitude in determining the way in which the materials will be used?
6. Are the materials so organized that provision is made for individual experiences which have worth-while values apart from the group activities?
7. Are the materials so organized that provision is made for effective training in information, skills, habits, understandings, and desirable attitudes and appreciations?
8. Are the materials so organized that they lend themselves to optimum use for both teacher and pupil?
9. Are the materials so organized that provision is made for frequent revision in the light of both teacher and pupil evaluations and needs?

*IV. Evaluation***A. PURPOSE**

The purpose of evaluation is (*a*) to provide interesting and valuable opportunities for each individual to appraise his own progress; (*b*) to satisfy a desire for a more thorough understanding of the individual pupil; (*c*) to provide a basis for intelligent and continuous modification of learning procedures to meet individual differences in abilities and needs of pupils; and (*d*) to determine the extent to which the accepted objectives of education are being achieved.

1. Is each pupil given assistance in determining his own progress from day to day and in realizing the value of determining such progress?
2. Is the process of evaluation conceived of as an integral part of the learning experience?
3. Does it provide optimum opportunities for furthering the growth process of the individual?
4. Do the suggestions for evaluating pupils' work indicate the probability that they will contribute constantly to the improvement of educational procedures?
5. Do the evaluation procedures contribute to a realization of the extent to which the accepted educational objectives are being achieved?

B. VARIETY

The evaluation process should incorporate a variety of techniques and should provide for pupil self-evaluation as well as teacher appraisal of pupils' work.

1. Is provision made for the individual to appraise his own progress in terms of both himself and his group?
2. Does the work or materials suggest methods whereby the teacher may evaluate the pupils' work in terms of the individual pupil as well as in terms of the group?
3. Are various techniques, such as observation, the oral examination, and the written examination, utilized in the evaluation process?
4. Are various devices of measurement and of recording pupil growth, such as the anecdotal record, the questionnaire, and the self-rating scale, brought into use in the evaluation process?

C. VALIDITY

The validity of any form of evaluation should be determined by (a) the degree to which this evaluation approximates natural situations, (b) the degree to which the individual accepts the need or purpose of evaluation and participates and cooperates in the process, and (c) the degree to which the various aspects of behavior are evaluated in relationship to other aspects of behavior which emerge to form the whole experience.

1. Are the evaluation procedures set up in such a way that they become a natural part of an actual learning situation?
2. Does the work or materials offer suggestions that will lead to the "acceptance" by the pupil of need for evaluation?
3. Are the evaluation procedures such that they not only permit but tend to encourage the wholehearted cooperation of the individual in the evaluation process?
4. Is pupil growth measured in terms of the actual maturation levels of the individual at the time the evaluation takes place?
5. Do all devices and techniques of evaluation have a reasonably high reliability?

D. AREAS OF GROWTH

Evaluation of pupil progress should include the appraisal of physical, emotional, and social, as well as mental development.

1. Is provision made for the appraisal of desirable personal traits, such as ambition, integrity, and responsibility?
2. Is provision made for the appraisal of desirable social traits, such as the traits of cooperativeness, adaptiveness, and social sensitivity?
3. Is provision made for the measurement of desirable intellectual traits, such as open-mindedness, clear habits of thinking, insight, and general mental stability?
4. Is provision made for the appraisal of basic understandings and informations, generalizations, and concepts in social studies, natural science, literature, fine and general arts, and other areas?
5. Is provision made for the appraisal of growth in appreciations, attitudes, and ideals in the aesthetic arts and the social and physical sciences?
6. Is provision made for the appraisal of desirable emotional

traits which foster emotional stability, such as love, friendliness, sympathy, and good will?

7. Is provision made for the appraisal of many desirable interests in literature, in the social studies, in science, and in the recreational world?
8. Is provision made for the appraisal of desirable physical characteristics, such as good physique, good posture, and general good health?
9. Is provision made for the measurement of basic skills, techniques, and abilities, such as cooperative living, interpreting symbols, problem solving, reading, writing, mathematics, library skills, and expressional techniques?

E. INTERPRETATION

Definite suggestions should be provided for interpreting all evaluation data in the light of known limitations and as nearly as possible in terms of the whole organism.

1. Is the "normal" individual conceived of as one who is not average in every phase of his growth, but deviates from the average in many areas of development?
2. Is provision made for drawing all evaluation data together into an "integrated portrait" of the individual, instead of using separate and minute data to indicate growth?
3. Are the interpretation and use of the data in consonance with the purpose of evaluation indicated in section A above?
4. Is provision made whereby the pupil grows in the ability to interpret with increasing accuracy the raw data of his own evaluation not only in the light of his own personal development but in terms of his social contributions as well?
5. Are all evaluation procedures, their interpretations and use, continuously appraised and revised in the light not only of their own efficacy but of changing educational goals and objectives as well?

APPENDIX II

Some Principles for Establishing and Conducting a Curriculum Workshop-Laboratory

WHAT are the functions of a curriculum laboratory or workshop in action and how can these functions be carried out most effectively? What principles should govern the planning and operating of a workshop-laboratory?

1. The laboratory or workshop should be planned, operated, and evaluated by those who are to utilize it. This, of course, is the first principle of sound democratic procedure. The violation of this principle is one of the chief reasons why the materials in some laboratories, although highly valuable, are so seldom used. Frequently the decision to establish a laboratory and the work of setting it up have been carried through not only without securing from those whom it is to serve ideas regarding its functions and policies, but in some cases without even notifying them that it is to be established. As a result the laboratory, or at least a large part of its resources, sometimes bears resemblance to medieval archives. The principle discussed here is so significant that it should be applied not only in the planning of new laboratories, but in the reorganization of those that now exist. While such a policy may in some cases detract from certain functions and services thought to be highly valuable by those in charge of the laboratories, large compensations will be provided in the form of better understandings, far wider and more effective use of materials and services, and a smoother and more effective translation of theory into practice.

2. The laboratory or workshop should provide inspiration and facilities for conducting research, investigations, experimentation, and other work of a practical nature. This function is implied, of course, in the term "laboratory." The areas in which work is launched should grow out of the real problems of the group which the workshop or laboratory serves. These problems should emerge from discussion and ob-

servation, and, above all, should be the formulations of all needs that are genuinely felt. For example, let us suppose that a public school system is initiating an integrating type of program in one of the junior high school grades. The materials utilized in this program have been developed by the teachers with the assistance of the curriculum laboratory staff. Serious questions have arisen in regard to the goals that may be attained. These questions range from the sincere doubts of parents and some teachers regarding the efficacy of the integrating curriculum as far as spelling and computation are concerned, to a genuine desire on the part of others to know what improvement, if any, might be expected in social understandings and controls, attitudes, and appreciations. The curriculum laboratory might quite properly assist or lead (depending on the organization of the school system) in the development of a program of evaluation which would provide the soundest answers to the questions which had arisen. The results of the evaluation project should then flow back into practice as rapidly as is practicable.

In the college curriculum laboratories or workshops, time and personnel should be available for conducting that type of needed research which requires such concentrated personal effort, degree of specialization, and range of facilities that it is impracticable to undertake it in the field. Two examples of this type of research follow:

Davies,¹ after years of careful bibliographical research and consultation with specialists in the variety of fields involved in housing and city planning, succeeded in preparing for teachers a statement of those generalizations and understandings which are most valuable to school pupils and citizens generally in this intricate area. The results of this research have been helpful to many teachers working on some aspect of the problem of housing our American people. In 1937, Oberholtzer completed a similar study in the important field of agriculture.²

In addition, college laboratories should begin to stress that part of their program which would enable them to assist public school communities in certain aspects of the investigations these communities

¹ Davies, J. Earl. *Fundamentals of Housing Study. A Determination of Factors Basic to an Understanding of American Housing Problems*. New York: Bureau of Publications, Teachers College, Columbia University, 1938.

² Oberholtzer, Kenneth E. *American Agricultural Problems in the Social Studies. Some Important Agricultural Problems and Related Generalizations That Should Be Considered in the General Curriculum of Urban and Rural Schools*. New York: Bureau of Publications, Teachers College, Columbia University, 1937.

may have under way. Happily, the trends of the day are pointing in this direction. In the curriculum division of one college, for example, a course (dealing exclusively with field problems) is being offered by several professors—curriculum generalists, generalists in primary, upper elementary, and secondary education, and subject matter specialists. The graduate students in this class are candidates or prospective candidates for the Doctor's degree. The work in 1941 consists of assisting one community in a curriculum program which it is hoped will extend over a period of years. The facilities of the curriculum laboratory in this college are being geared to meet the needs of this project. One significant value of the plan is that when problems come from the field, advice and suggestions can be secured officially from the subject matter specialists as well as from generalists. While this was possible to some extent in previous years (mostly, however, through personal contacts), the present arrangement provides officially that a certain proportion of the time of the members of the college staff in this cooperating group be set aside for this work. Similar procedures can be found in other colleges.

Another point of significance is the actual opportunity for generalists, subject matter specialists, and advanced students to work together on real field problems. If those in public schools feel that it is difficult to find people with sufficient time and interest to work together on projects of common concern, they should look behind the scenes in most of our institutions of higher learning. Here the situation is even more acute. This is not due to lack of willingness on the part of the staff to cooperate, but in many instances to highly specialized interests. We in the colleges are already learning much from those in the public schools. We need and expect to learn much more.

3. The staff connected with the curriculum laboratory or workshop should be able and willing to advise regarding the problems of the group involved. Obviously it is impossible for any one of the members of a curriculum staff to be equipped to give advice on all the questions that might be raised. The chief contributions in advisement can be made by suggesting types of procedures to follow in solving the problems with which they are confronted and by assisting teachers and others who use the laboratory or workshop to find the materials that will be most helpful. In such a plan the personnel connected with the laboratory would not be expected to furnish final decisions, but would consult regarding possible directions individuals or groups might take

and the materials they might examine with the greatest benefit. Here is one of the most valuable opportunities for the staff of a curriculum workshop or laboratory to challenge and stimulate promising thinking and working on the part of others.

4. The workshop or laboratory should contain live materials which will be of the greatest possible value to the group it serves. The principle of selectivity suggested here should be employed much more extensively. Thousands of courses of study with little or no indication of the sections most valuable for certain purposes may be a hindrance rather than a help. In the first place, the uninitiated may find in ninety per cent of these courses suggestions which in their judgment constitute sufficient reasons for maintaining the (rather mediocre) status quo of the work they are doing. Moreover, such a vast bulk of material may discourage and confuse a teacher unacquainted with curriculum laboratories.

Various sets of criteria have been developed for determining the value of courses of study and other curriculum material. At present these sets of criteria are too general. Much needs to be done in the formulation of more refined criteria for specific purposes. For example, what kind of criteria are needed to select the content and experiences in given areas which will do most toward assisting teachers and pupils in arriving at a sounder social philosophy? What kind of criteria would be most effective in selecting materials and experiences of the highest import in certain aspects of social studies or science?

One of the chief values to be derived from criteria can be found, of course, in the act of developing them. In this process the participants are compelled to focus their attention upon pivotal points and advance the arguments pro and con, which is a very real kind of education.

The materials in the workshop-laboratory then should be selected and used chiefly on the basis of their effectiveness in assisting those whom it is supposed to serve. They should not be considered as ends in themselves, but as implements in the projects undertaken.

5. The curriculum workshop-laboratory must be an integral and integrating part of the educational plan of any community or institution. This, of course, is a corollary of Principle 1. Save for the rare exception the curriculum workroom should not be a laboratory in the sense that discoveries are made there by the staff alone and handed out to others to be taken as prescribed. Its staff must work with the other administrative divisions on projects which have been mutually agreed upon

as valuable. As long as the laboratory or workshop is functioning in the real tasks of education in the community, it makes little difference whether it is called a "curriculum laboratory" or some other name, such as the "teachers' workshop," the "curriculum and teaching laboratory," or the "instruction laboratory." The name workshop-laboratory is proposed here in the hope that the best features of existing laboratories and workshops may be included.

There is a real need at this time to take inventory of the ways in which curriculum workshop-laboratories can function still more profitably. The study of Miss Leary,³ together with supplementary data collected since the publication of the study, gives unmistakable evidence that the number of curriculum laboratories and workshops is growing rapidly. There may be a danger, however, of mushroom growth. It is highly important that a plan be inaugurated whereby, first, a searching study be made of the range and, if possible, the quality of the functions performed by the different laboratories (or workshops); second, a way be found by which work and materials of all these may be made more readily available to all interested persons; and third, suggestions be developed regarding the improvement of curriculum workshops and laboratories and the way in which they can most profitably serve education by working together.

³ Leary, Bernice E. *Curriculum Laboratories and Divisions*. Bulletin No. 7. Washington, D. C.: United States Department of the Interior, Office of Education, 1938.



135 946

UNIVERSAL
LIBRARY

